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PRINCIPLES OF SURGICAL PRACTICE

SURGICAL BACTERIOLOGY

FRANK L. MELENEY, M.D., F.A.C.S., New York, New York, Presiding

Collaborators: EDMUND ANDREWS, M.D., F.A.C.S., Los Angeles, California; J. DERYL HART, M.D., F.A.C.S., Durham, North Carolina; WILLIAM A. ALTEMEIER, M.D., F.A.C.S., Cincinnati, Ohio

INTRODUCTION BY DR. MELENEY

IS any one surprised that surgery and bacteriology are linked together? Just remember that six decades ago there was no science of bacteriology, and surgery was plagued with inevitable infection which followed operative procedure. Pasteur had just demonstrated against strong opposition that bacterial growth caused fermentation and putrefaction. Lister applied this knowledge to surgery and again against strong opposition he brought postoperative infection under control. Surgery became Bacteriological Surgery and increased aboundingly in its scope. The science of bacteriology gradually built up certain rules for aseptic technique. Surgery adopted these rules and then went merrily on its own way—and forgot all about bacteriology—like a husband who gains distinction because of the wisdom and labor of his wife and then divorces her because he thinks he has outgrown her and believes he can stand on his own feet without her help. Why has Surgery forgotten Bacteriology? I believe that it is because the training of a surgeon requires long hours of technical experience not needed by the medical man. The surgeon's day in the hospital often begins an hour earlier and ends an hour later than that of his medical confreres. Furthermore, the surgeon must devote long hours to the detailed study and frequent review of anatomy. But the time has passed when the surgeon is content to perform the mechanics of surgery and let others solve the scientific problems connected with his art. Twenty odd years ago, after my returning from France, when I went to my chief, Dr. Allen O. Whipple, for advice regarding my further training in surgery, he said, "In the past, the surgeon has had to be an anatomist, now he tries to be a pathologist, in the future he will have to be a physiologist, a chemist or a bacteriologist. Which do you want to be?" I chose bacteriology and ever since then my chief interest has been in surgical infections.

Now there are large groups of surgeons working on chemical problems, for example, blood chemistry, water and electrolyte balance, blood coagulation, and vitamin deficiencies. There are also many young surgeons working in the field of physiology—blood flow, respiration, gastro-intestinal motility, peripheral circulation. But the field of bacteriology has not been widely explored by surgeons, although the problems in it are legion.

Modern surgery must not only acknowledge its debt to bacteriology but must look to it for the solution of many of its problems. About a third of the cases in the surgical wards of a general hospital are primarily problems of infection. Furthermore, all of the other cases are potentially or have actually become problems of infection by the very fact that they undergo an operation. And these problems must be solved by surgeons who have been trained in the fundamental principles of bacteriology rather than by bacteriologists who do not have a surgical point of view.

Panel Discussion, Clinical Congress of the American College of Surgeons, Chicago, Illinois, October 23, 1940.

What are some of the bacteriological problems of surgery? They may be divided into four groups: (1) routine work, (2) emergency work, (3) special minor research, and (4) major research.

Routine work includes the bacteriological control of the sterile technique in the operating room, and the periodic check-up of autoclaves, water and instrument sterilizers, scrub-up procedure, and air contamination. It also includes the isolation and rapid identification of the organisms present in cases of potential or established infection which come daily into every surgical clinic and hospital. This must include both aerobic and anaerobic methods of cultivation and represents a large proportion of the work done from nine to five each day. The laboratory should be able to determine promptly the bacterial etiology of every case presenting an inflammatory process. Is your surgical bacteriology laboratory able to do this routine work?

Emergency work is perhaps less in quantity but may be of more importance than the routine service. It must be available any time of the day or night. It often determines the nature of the treatment. A patient comes in with a high fever, he is septic, and there is no evidence of localization. An emergency blood culture is required in order that the surgeon may know as soon as possible the nature of the infection. Another patient has a swollen knee-joint with pain and redness. The surgeon aspirates and asks the bacteriologist to tell him immediately by examination of a smear, if possible, what organism, if any, is involved. A tendon sheath is infected and is opened in the operating room. The proper treatment depends upon the surgeon's knowing as soon as possible what kind of bacterium is present. An immediate smear will probably tell him, confirmed next day by culture. A bad accident case comes in with a large lacerated wound contaminated by street dirt. The wound must be débrided and the tissue planted at once in aerobic and anaerobic media to determine as soon as possible with what organisms the surgeon has to deal and whether there is a risk of the development of tetanus or gas gangrene. A patient with obvious peritonitis comes to the surgeon. He operates and finds a peritoneal exudate but no obvious cause for it—an immediate examination under the microscope may reveal the secret and an early culture will point the way to therapy. Immediate smears and early cultures are particularly important in such rapidly spreading infections as gas gangrene. Is your laboratory equipped and have you personnel qualified to give twenty-four-hour service in this kind of surgical bacteriology?

Special minor research is involved in connection with cases of unusual infection which may come into the clinic or hospital at any time. It is not simple. It requires special time and attention on the part of the bacteriologist. He must look at the problem from a surgical viewpoint. He must see the patient and examine the lesion and then call upon some of his special bacteriological training to help him solve the problem. Special media may be necessary to reveal the causative organism. Animal inoculation may be required. A mixture of organisms may have to be separated and the essential species determined. Its susceptibility to bacteriophage or to some chemotherapeutic agent may have to be ascertained. Certain of these cases may have to be cultured again and again during the course of special treatment to determine its efficacy. Is your laboratory equipped to perform this special research in unusual cases?

Major research involves the serious attack on various aspects of any of the major problems of surgical bacteriology. Take for example the question of antiseptics. The surgeon wants antiseptics to perform a number of different functions. He wants something that can be used as a hand wash to remove or destroy organisms picked up on the hands when he has examined or dressed a patient. He wants something that will sterilize the skin before operation. He wants something that will destroy bacteria on sharp instruments. He wants something that he can safely put on a recent wound to prevent the development of an infection and something else perhaps which will kill or injure organisms which have already established an infection. Finally, he wants something which can be taken enterally or given parenterally which will reach inner foci of infection and inactivate the organisms producing these lesions. Almost every week some representative of a commercial firm comes along with some antiseptic which he claims will do one or all of these things. It is the responsibility of surgical bacteriology laboratories to evaluate these claims, perhaps by some coordinated plan.

Then let us take the problem of local immunity. Surgical infections are usually localized processes and if recovery takes place with the aid of surgery we must understand the process of fixation or localization and we must take into account the local defenses of the body which halt the progress of the infection, and the mechanism of the reparative process. This would seem to be a fundamental problem for the surgical bacteriologist, which would bear rich fruit if it could be solved.

Another major problem is peritonitis with its many baffling side issues. For an understanding

of the problem of peritonitis one must know all about the intestinal organisms and their synergisms and antagonisms; one must understand the digestive and motor functions of the gastrointestinal tract; one must have a clear conception of water and electrolyte balance; but it is primarily a problem of bacteriology, for bacteria generally initiate the process.

Another problem of major importance embraces the all important effect and mode of action of the newer chemotherapeutic agents in various types of infection. This has opened up a wide field to the surgical bacteriologist. Laboratory and clinical observations have already been made with regard to the general and local application of zinc peroxide and the sulfonamide group of drugs, both in the prophylaxis and in the treatment of certain infections, but in many of these reports there has been evidence of very inadequate bacteriology—especially of the anaerobic organisms. Has your laboratory the necessary equipment and personnel to carry on effective major research on any of the important problems in surgical bacteriology?

In going about the hospitals in the city of New York and its suburbs to see various types of surgical infections, I have been surprised to find how often the most obviously necessary bacteriological procedures have been neglected in the study of the case in hand. Anaerobic bacteriology has been particularly neglected. In 1937, I sent out a questionnaire to all of the hospitals in the city asking them particularly whether they were equipped to perform anaerobic cultures and how often the laboratory was called upon by the surgeons to perform this function. Out of 137 hospitals in the city 76 responded to the questionnaire. This included all of the larger hospitals. Presumably the other 61 had little or no facilities and little or no interest in the question. Of the 76 which replied only 8 claimed to be fully equipped for anaerobic bacteriology, 6 others were fairly well satisfied that they could handle this work, 37 indicated that they were not satisfactorily equipped, and of the other 25, 15 had no bacteriological laboratories at all. Thirteen of the hospital laboratory heads stated that the surgical department frequently called upon them for such culture. Eleven reported that there were occasional requests. In 34 they were made rarely and in 18 never. I am sure that this is not a condition which is unique in New York. The publication of articles concerned with surgical infections even in our best surgical journals are filled with evidences of inadequate bacteriology in connection with the cases reported and frequently the surgical authors make apologies for the bacteriology done in their own hospitals. It is partly the surgeons' fault. If they want good surgical bacteriology enough they will demand it and will get it.

I called the attention of the Hospital Standardization Committee of the American College of Surgeons to this situation and asked them if they would look into the matter and consider the disapproval of those hospitals not fully equipped for adequate surgical bacteriology. That may be one reason why they asked me to lead this panel discussion today. If you surgeons show enough interest in this problem, there is some hope that this will receive their attention this year. If the board of trustees understands that their hospital would not have the approval of the American College of Surgeons without this service, it would promptly be made available. I would grade hospitals in some such way as this: hospitals equipped to perform major research, minor research, twenty-four-hour emergency service, and routine aerobic and anaerobic bacteriology would be approved and given A+; hospitals ready for all but major research would be approved with an A; hospitals prepared for twenty-four-hour emergency service and routine work would be qualifiedly approved with a B and urged to improve the service; hospitals only doing routine work would not be approved and would be rated C; and hospitals without facilities for doing even routine aerobic and anaerobic bacteriology would not be approved and marked D. With these criteria where would your hospital or surgical service rate today?

I am now going to call upon Dr. Edmund Andrews of Los Angeles, California, to enlarge upon the importance of adequate surgical bacteriology for the general run of surgical infections, and upon Dr. Deryl Hart of Durham, North Carolina, for a discussion of the continuous control of operating-room technique, and upon Dr. William Altemeier of Cincinnati for further suggestions with regard to the field of research.

THE IMPORTANCE OF ADEQUATE TRAINING FOR THE SURGICAL BACTERIOLOGIST

EDMUND ANDREWS, M.D., F.A.C.S., Los Angeles, California

IT is almost axiomatic that the value of a bacteriologist's report is in direct proportion to his training and experience. If this truth were more generally recognized we would not have surgical bacteriology so often relegated to a poorly trained technician or to an interne who has not seen a bacterium since his course in bacteriology in his first or second year in medical school. That this is so is only too obvious in many reports of surgical infections appearing in our surgical journals. We often see that cultures of such cases yielded "streptococci" without specification whether they were hemolytic or nonhemolytic, aerobic or anaerobic; or "staphylococci" without further specifications; or "a gram positive organism morphologically like the gas bacillus" without any real proof of the presence of the clostridium welchii.

Every surgical department needs not only a thoroughly trained bacteriologist who can give an exact and complete analysis of every culture from any surgical infection but preferably one who has had surgical training and can evaluate clinical findings and correlate them with bacterial findings.

This is true particularly in emergency cases in which a quick report is required in order to determine the method of treatment. Often a stained smear will give valuable information within a few minutes. The examination to be of value, however, must be made by an expert who can appreciate the significance of what he sees in the light of his experience both with the particular clinical type of infection under consideration and the specimen therefrom. This may be particularly difficult when the specimen shows not one but a great mixture of organisms—the significant organism being masked by the presence of "fellow travellers." Here relative numbers of the different morphological types may be of some importance.

Such preliminary reports must, of course, always be checked by the findings after bacterial cultivation. To an expert eye the presence of certain organisms in the smear or certain features of the clinical picture may indicate the need for special methods of culture or special media in order to find out all of the organisms which are present. The expert will, of course, have available and will use routinely anaerobic as well as aerobic methods in order to determine the presence of anaerobes as soon as possible.

One field of bacteriological examination which particularly requires an expert's opinion is in unsterile regions in which changes in the number or kind of bacterial flora may take place and thus indicate a pathological process. These regions include the upper respiratory tract, all of the alimentary canal, and the vagina.

It is important that the surgical interns or residents should be given a period of training under such an expert in order that they may more fully understand the pathogenesis and natural course of the surgical infections. It is also advisable for one individual to see a case through from beginning to end so as to note the bacteriological changes which indicate the response or the resistance of the infection to the treatment given. Quantitative as well as qualitative studies are often of considerable importance and these can be made by the direct cultivation of the exudate on blood agar plates, aerobically and anaerobically.

Surgical bacteriology is almost a generation behind other fields of bacteriology and other fields of surgery. It should be a strong link binding the two together. There are many problems still to be solved and this can best be done by or under the direction of one who has had a thorough training both in surgery and in bacteriology.

The cost of such a service may seem high but whenever an adequate surgical bacteriology service is established it soon demonstrates its value to the surgical department. A continuous study of the problem of the infection of clean operative wounds keeps the surgical staff keen to avoid bacterial contamination of wounds. The early recognition of the etiological agent will determine early treatment and thus many times may save a life or curtail the period of stay in the hospital. Under expert guidance certain of the many problems of surgical infection still unsolved may reach a final solution by methods of research entirely outside of the capacity of laboratory technicians. It is hoped that the surgeons in this College who do not have available such a service will demand adequate aid upon their return to their stations.

Panel Discussion. Clinical Congress of the American College of Surgeons, Chicago, Illinois, October 23, 1940.

THE CONTINUOUS CONTROL OF OPERATING ROOM TECHNIQUE

J. DERYL HART, M.D., F.A.C.S., Durham, North Carolina

DO we need continuous bacteriological control of our operating-room technique? We might as well ask if a modern army needs an intelligence division, scouts, and secret operatives to keep it informed as to the activities of the enemy. Bacteriology is the intelligence division of the Surgical Department, and no surgical department is justified in taking human lives into its hands without having the most accurate information as to the bacterial activity and distribution in the vicinity of the wound, including all people and materials that come in proximity to and in contact with the patient. Every surgeon should analyze critically each step in his operating technique and the preparation of the necessary supplies. This cannot be delegated to someone not familiar with surgery and its problems, as can best be illustrated by two episodes from my own experience.

In 1925, as the result of a series of infections on the Surgical Service where I was working, a bacteriologist was brought in to find the weakness in our technique. He observed for days, carefully inspecting every procedure. In the end he stated that we had an "air tight technique" but he had totally ignored the possibility of carriers in the personnel, the effectiveness of the masks used, and the possibility of the air itself serving as a medium for the transportation of bacteria to the wound and sterile supplies.

The second episode occurred shortly after the opening of the Duke Hospital. While we were hypersensitive to any untoward results in the new institution, we had occasional unexplained infections which could not be avoided. More or less blindly, without bacteriological studies, we tightened up on our technique at every possible point as we then understood the problem, but without satisfactory results. Then the surgeons themselves undertook bacteriological checks on every phase of our technique and were greatly surprised to learn that we could obtain our chief offender, the hemolytic staphylococcus aureus, from the air by sedimentation more frequently and in greater numbers than from all other sources combined (exclusive of the noses and throats of the occupants from which they were ejected into the air). We then plotted a curve showing the daily sedimentation rate of these organisms, hoping to be able to anticipate the periods of danger for large operative procedures. The peaks of air contamination corresponded to the epidemics of respiratory infections. After attempting in various ways to control the contamination of the air, but with only moderate success, we finally resorted to sterilization of the air with bactericidal radiation. With the elimination of this hitherto largely ignored source of contamination of wounds and supplies our unexplained infections in clean wounds have all but disappeared. This study would not have been carried through by any one other than the surgeons who went through the agony of every severe infection that occurred. As a matter of fact, criticisms were expressed because of the quantities of culture media which were being used in the attempt to solve this problem.

In order to obtain the best results every surgical department must be in a position to answer by actual bacteriological studies any problem or question which may arise in regard to technique. The older members of the staff may or may not have accurate information in regard to the effectiveness of various measures employed, but the regular check with cultures which should be inspected by each member of the staff will go far to impress on the younger men the true value of their so-called aseptic technique.

Autoclaves, sterilizers, and hot and cold water tanks should be subjected to bacteriological culture tests at regular intervals. These may be carried out at the request of the Surgical Supervisor, but every surgeon should be familiar with their results.

The effectiveness of the skin preparation should be controlled by periodic cultures for every method of clean-up and every type of antiseptic. A report may be filed by the bacteriologist or the surgeon assigned to this task but these cultures should be inspected by each member of the staff. A permanent record, of course, must be kept for purposes of comparing one technique with another.

It is not enough to know the effectiveness of skin antiseptics in giving a temporary absence of

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viable organisms on the surface for we must also know how long the surface of the skin remains sterile under varying conditions, particularly in the presence of perspiration. Anyone who has seen the heavy growth of organisms that may be obtained from cultures of the perspiration on the skin in the operative region will not have to be told that it must not come in contact with his gloves, instruments, supplies, or the wound.

What can be done about this rapid contamination of our "sterile" field of skin brought about by the perspiration washing organisms out of the deeper structures?

The skin must be isolated from the operative field as soon as the skin incision is made, and must be resterilized when it is exposed again for closure.

How many organisms gain entrance to a so-called clean wound, or to the wound of an appendectomy, cholecystectomy, stomach or intestinal resection, or an amputation for gangrene of the foot? This necessarily varies widely under different conditions and with different surgeons. Wash out the wound thoroughly with a small amount of physiological salt solution: pour this solution in a culture plate with suitable culture material; count and identify the colonies. The number may be so great as to be a surprise to many. The surgeon who sees such a plate will undoubtedly during subsequent operations attempt to improve his "aseptic technique."

The knowledge of the degree of bacterial contamination in a given wound should enable the surgeon to determine more intelligently the manner in which it should be treated. Should it be closed without drainage, or should drains be inserted? Should it be left open with antiseptic packs and a secondary closure carried out, or should it be left to heal by second intention? Everyone familiar with the principles of wound healing based on our knowledge of immunity and resistance, on seeing the cultures from his so-called clean wounds, should receive a renewed stimulus to control hemorrhage, to obliterate dead space, and to avoid strangulation of tissues, unnecessary irritating drains and sutures, abnormal mobility in the wound, and undue tension and trauma, and in every way to leave the wound in the best condition for the natural body defenses to cope with the bacterial contaminants.

How efficient is scrubbing with soap and water in rendering the hands free of bacteria? How effective is 70 per cent alcohol or other antiseptics in killing the bacteria on the surface of the hands? How long does the surface remain relatively sterile? What is the effect of a puncture in a glove, partly filled with perspiration loaded with bacteria? How difficult is it to remove pathogenic bacteria from the hands soiled in performing a dressing on an infected wound? Suitable cultures will give the best answer to these questions for each individual surgeon.

What part do street shoes play in bringing pathogenic bacteria into the operating room?

Should the orderlies and nurses change their operating room clothes daily as do the doctors? Can these questions be answered intelligently without knowing the bacterial contamination present?

In a given clean operation which entails the greater risk to the patient—the presence in the operating room of a heavy carrier of the hemolytic staphylococcus aureus in his nose and throat, or a preceding operation on a lesion infected with this same organism? As for me, after many cultures of the air, I am far more afraid of a cough, sneeze, spoken words, or even breathing, by a carrier of the hemolytic staphylococcus aureus, which inoculates the air with this organism than I am of the possible transfer of infected pus by contact from a preceding operation in the modern well run operating room. This comparison does not mean that we should not have separate rooms for operations on infected cases but is used to emphasize the danger arising from the presence of apparently healthy individuals who carry highly pathogenic organisms in their noses and throats.

Of how much importance is an efficient ventilating system? Does washing and filtering remove the bacteria from the air? Are the organisms in the outside air pathogenic? Is a draft in the operating room more likely to blow bacteria on the wound or to blow the bacteria given off from the personnel away from the wound? Does an efficient ventilating system keep down the concentration of pathogenic bacteria given off into the air from the noses and throats of the personnel? Is it better to "sweat it out" with the attendant risk of contaminated perspiration soaking through the sterile gown and dripping on the sterile field or to have a current of air from a well placed electric fan to keep the operator cool? How many bacteria can be stirred up from the floor of the well kept operating room by the use of electric fans?

How soon does the air in the unoccupied room become relatively free of sedimenting viable bacteria? How rapidly does the air become contaminated with bacteria when the room is re-occupied? What is the effect of the number of occupants and the duration of occupancy on air contamination? What types of bacteria are found in the air? Are the bacteria in the air the same as the ones

which cause the wound infection? From what source do they come? Are they the same as those in the noses and throats of the occupants? Is there any correlation between the number of organisms in the air and the degree of contamination in the noses and throats of the occupants?

Can epidemics of infected wounds be traced to carriers in the operating-room personnel? Can the air contamination be controlled by the elimination of carriers? How many of the operating-room personnel are carriers of pathogenic bacteria in their noses and throats? How efficient is the mask used in your operating room? What is the effect of sneezing, coughing, or talking? Will the air become contaminated if only breathing (no talking, coughing, or sneezing) is permitted? Is there any effective means of controlling the air contamination in the operating room?

These and many other questions can be answered to your satisfaction if you have an efficient bacteriological service as a part of or connected with your surgical department.

SOME SURGICAL BACTERIOLOGICAL PROBLEMS STILL TO BE SOLVED

WILLIAM A. ALTEMEIER, M.D., F.A.C.S., Cincinnati, Ohio

ALTHOUGH bacteriology has given to surgery aseptic technique, more accurate diagnosis, and more effective treatment of many surgical infections, I believe that the field of surgical bacteriology has only been touched superficially, and that even greater contributions are to come. There are many problems still to be solved. To be convinced of this, it is only necessary to go through the wards of a general hospital and note the number of surgical infections of which the etiology is obscure or unknown, of which the effects upon the human physiology are unexplained, and of which treatment is palliative and inadequate. It will be possible to discuss here, only the more obvious unsolved general problems and a few specific ones.

Comparatively little is known about the metabolism and growth of bacteria, and it would seem that their thorough investigation is important and necessary to understand the action of infection upon human physiology. There is good reason to believe that differences in environment may affect bacteria much as they do human beings. The size, form, rate of growth, and virulence of a given species may be varied by environmental changes. The explanation and significance of this is not clearly understood. Although many of the factors favoring good growth and toxin production are recognized, comparatively little is known about the nature and products of bacterial action upon human fats, carbohydrates, and particularly proteins. The manner in which these substances are broken down and the nature of the resulting products are little understood. It will be interesting to learn the role played by these substances in the production of clinical symptoms in infections. With the development of better methods of anaerobic cultivation, it will be possible to study the metabolism and pathogenicity of anaerobic bacteria which as a group have been greatly neglected. The importance of anaerobic bacteria in infection is greater than generally realized.

Bacterial symbiosis in disease has attracted relatively little attention in medicine and surgery. The course of medical investigation and reasoning since the time of Pasteur, and more particularly Koch, has been toward the mono-etiology of disease. Indeed, the fulfillment of Koch's postulates is generally required for the establishment of the specific etiology of any infectious disease. Largely for this reason the true nature of many pathological processes has remained obscure. In nature bacteria are rarely found in pure culture. Likewise in human infections such as peritonitis, lung abscess, putrid empyema, appendiceal abscess, and chronic progressive cutaneous gangrene, bacteria are commonly found in mixed culture, existing in a state of mutual benefit and exerting a cumulative action. Little is known concerning the cumulative metabolic products of mixed bacterial growth, but it can be clearly shown that such cultures exert a synergistic pathogenic action far greater than the combined individual pathogenic action. A knowledge of the nature of bacterial symbiosis and synergism would aid in understanding many obscure pathological processes.

There are many questions concerning susceptibility and immunity to infection still to be an-

From the Department of Surgery of the University of Cincinnati and the Cincinnati General Hospital.

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swered. What is the nature of immunity? What are the processes by which it is produced? What are the circumstances which determine whether or not a given type of organism will produce infection when introduced into an accidental or intentional wound? What is the explanation for the ability of certain saprophytic, apparently harmless microorganisms to assume suddenly pathogenic powers for the host? It is not clearly understood what part hypersensitivity to bacterial proteins plays in susceptibility, resistance, and immunity to infection. The factors which determine the formation of antibodies are not clear. Why is immunity transient to some types of infection and permanent with others? It has been suggested that antibody formation occurs only as long as direct antigenic stimulation occurs. This is an interesting theory, but it must be proved.

The problem of infection in the diabetic is of especial interest. The explanation for the peculiar susceptibility to infection in diabetes was ascribed by older writers to the increased sugar content of the blood and tissues. Studies along this line have not aided in solving the question and there is still no adequate solution. This problem has great practical importance not only because of the seriousness of infection in diabetics, but also because of the greatly increased risk of operating upon diabetic tissues.

In addition, there are many individual and controversial problems to be solved by surgical bacteriological investigation. The etiology of human-bite infections, regional enteritis, acute and chronic cholecystitis, cholelithiasis, peptic ulcer, phlebitis (particularly that type associated with Buerger's disease), chronic thyroiditis, and many other surgical diseases remains obscure and confusing.

The role of intestinal bacteria and bacterial products in the toxemia of intestinal obstruction is still uncertain. The amount of absorption from intestinal obstruction and distention has been a matter for debate and experimentation for a long time, but the cause of death in non-strangulated intestinal obstruction, apart from that in high obstruction, is still unknown. The facts are little known, but the possibility of a large bacterial factor in the production of the clinical symptoms cannot be overlooked.

Likewise, the importance of sepsis in the toxemia of burns is a much disputed question. Whether or not this toxemia is caused by the altered blood chemistry secondary to the pouring of large quantities of plasma into the burned tissues, or the absorption of a toxin or toxins from the burned area, or from bacterial sepsis is not clear.

Peritonitis continues to present many perplexing problems. In the past we have usually been concerned with the more obvious and more easily cultured bacteria recovered from peritonitis. With the development of better media and means of cultivation, many other types of bacteria, particularly anaerobic, have been consistently found in peritoneal exudates. There is reason to believe that this disease represents a very complex process caused by the combined activity of many types of bacteria. The toxemia of peritonitis has not been explained. It has been assumed that the absorption of bacterial products is responsible for the clinical symptoms, although the nature and action of these products are still unknown factors.

In addition, there is much to be done to determine the value and limitations as well as the undesirable or harmful effects of chemotherapy, antitoxins and antisera, vaccines, bacteriophage, x-ray irradiation, and ultraviolet irradiation in the prevention and treatment of surgical infections. The search for the perfect antiseptic solution will go on, and it will always be the duty of the bacteriological surgeon to determine accurately the merits and limitations of each.

Finally, the development of better methods of treatment of dirty, contaminated, or infected traumatic wounds is obviously of immediate importance. This has been ably expressed by Dr. Mont Reid, who says: "The prevention of infection in a deliberate or planned wound is the real cornerstone of modern surgery. . . . The real problem of today is the prevention of infection in accidental or traumatic wounds." The factors governing wound healing are intimately associated with the principles of bacterial growth and tissue immunity. A greater knowledge of these principles will undoubtedly contribute much toward solution of this problem.

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Miliani, R.: Hemiresection of the Mandible on Account of a Large Adamantinoma (Emiresezione della mandibola per voluminoso adamantinoma). *Arch. ital. di chir.*, 1940, 58: 337.

A case of adamantinoma of the angle of the jaw is described in a girl of fourteen. These tumors are more frequently seen in females than in males, but the patient in this case was unusually young. The usual age ranges from thirty to fifty years. The growth of the tumor had begun about five years before, with the appearance of a nodule about the size of a hazelnut in the middle of the horizontal ramus of the jaw. It had grown to the size of a large hen's egg in the course of the five years. All of the horizontal ramus and about two-thirds of the ascending ramus had been destroyed by the tumor, which revealed the structure of a cystic adamantinoma in which cysts were just beginning to develop; there were no signs of malignant degeneration.

The tumor was removed by resection and disarticulation of the right jaw. A temporary prosthesis was inserted and it is hoped that after some months when there is no longer danger of infection a bone graft may be used to replace the lost bone.

A detailed description of the histological structure of these tumors is given. In this tumor there was an unusually large number of newly formed vessels. Such rich vascularization has not often been described; when such blood vessels have been noted they have been said to lie in the connective tissue which was pressed flat by the epithelial cords of the tumor. In this case they lay in immediate contact with the tumor tissue, without any interposition of connective tissue. AUDREY G. MORGAN, M.D.

EYE

Gifford, S. R.: Results of Surgical Treatment of Paralysis of the Superior Oblique and Superior Rectus Muscles. *Arch. Ophth.*, 1941, 25: 761.

The method of examination described by the late Alfred Bielschowsky for paralysis of the eye muscles is best. A few general principles which are especially useful may be recalled:

1. When a difference between the deviation of the two eyes on cover test can be determined, the eye showing the smaller deviation is the paralyzed eye.

2. When the vertical deviation of the paralyzed eye is greatest in adduction, an oblique muscle is involved; when it is greatest in abduction, one of the vertical rectus muscles is involved.

3. The image of the paralyzed eye is always seen in the direction in which the affected muscle should move the eye. This applies to the tipping of images, and hence it is easy to remember that with paralysis of the right superior oblique muscle the upper pole of the right image is tilted to the left.

4. When the tilting of images is marked and when tipping the head greatly increases diplopia, an oblique muscle is nearly always involved.

5. The principal action of a muscle should be considered primarily in the diagnosis of paralytic squint.

The author comes to the following conclusions:

1. Exact diagnosis is the sine qua non of surgical treatment of paralysis of the vertical and oblique muscles. The Bielschowsky method has given, on the whole, satisfactory results, as proved by improvement following operation.

2. Operative treatment of these conditions has proved gratifying. Patients are exceedingly grateful for any relief from diplopia and for any improvement in the binocular field, even when the result may seem to the surgeon functionally imperfect. No patient in this series regrets having undergone operation. One was in considerable doubt for nine months but is now perfectly satisfied.

In case of paralysis of the trochlear nerve, accompanied as it usually is by overaction of the inferior oblique muscle, myotomy of the homolateral inferior oblique muscle will usually be advised first and will frequently give a sufficient effect. If the effect is insufficient, recession of the opposite inferior rectus muscle will be employed. Only in cases of extreme hypertropia and after the two previously mentioned procedures have been tried should recession of the homolateral superior rectus muscle be considered.

LESLIE L. MCCOY, M.D.

Rea, R. L.: The Treatment of Thrombosis in the Central Vein of the Retina with Heparin. *Arch. Ophth.*, 1941, 25: 548.

Previous to the introduction of heparin it had been discovered that certain mammalian tissues contain one or more anticoagulants. McLean, in Howell's laboratory in 1916, first isolated an active fraction, which in 1918 Howell and Holt named heparin, and which was at first isolated exclusively from the liver tissue of the dog. Later, this substance was shown to be present in varying amounts in the lung, liver, and skeletal muscles of the ox, the lung containing the largest amount. During the past five years the anti-coagulant properties of heparin have been available for use outside of the laboratory.

Heparin is a polysaccharide of high molecular weight which also contains nitrogen and sulfur. It can be stored as a dry powder. If a single dose of heparin is given intravenously the clotting time be-

comes prolonged, the increase being proportionate to the size of the dose.

Heparin can be used in blood transfusion either by adding it to the blood as it is collected, or by injecting it into the donor, 1 mgm. of heparin per kilogram of body weight, and the blood is withdrawn from one to five minutes later. At the end of one and one-half to two hours the coagulation time of the donor's blood returns to normal. In general surgical practice, it is in operations on the vascular system that heparin is of the greatest use. It is the most active of all anticoagulants; it is nontoxic, and its use in no way interferes with the analysis of the blood.

How can heparin affect a venous thrombosis? The coagulation of the blood is retarded; the blood becomes more fluid; new fibrin is prevented from forming on the thrombus, and loose blood corpuscles are washed away, so that the thrombus does not become complete. The heparin permeates into the capillaries and may contribute to the more rapid absorption of the extravasated hemorrhages.

Heparin can also be used for extensive hemorrhages into the retina or the vitreous. It is not necessary to keep the patient in bed all of the time. Ambulatory patients can have two injections daily, each from 100 to 125 mgm., which makes a total dose of about 250 mgm., although Ploman frequently gave injections at four-hour intervals up to 400 mgm. daily. LESLIE L. MCCOY, M.D.

Doherty, W. B.: Orbital Implants, with Special Reference to Vitallium. *Arch. Ophth.*, 1941, 25: 637.

The tolerance of the orbital tissue to foreign materials has always been well known, and for this reason many substances have been implanted in Tenon's capsule. Most ophthalmologists of the present day concede that something should be put into the socket after enucleation in order to obliterate the unnatural folds and depressions in the upper and lower lids, and to prevent ptosis, impaired motility, and sinking of the artificial eye.

For this reason aluminum, celluloid, sponge, wool, silver, rubber, silk, catgut, peat, agar agar, paraffin, asbestos, cork, ivory, and other substances have been used with varying success. At present the most common implants are gold balls, glass balls, fat, and fascia lata. Each of these has its champions, and the author feels certain that there is no ophthalmologist who has not seen the unpleasant occurrence of an implant being expelled from the orbit for no apparent reason. The operation seemed perfect and there were no complications; nevertheless, the implantation was a failure.

The author calls attention to an alloy called vitallium, and the medical uses to which it has been applied, as well as the clinical and scientific experiments that have been performed with it.

Vitallium is a casting alloy, 90 per cent of which is composed of cobalt and chromium, with a smaller percentage of molybdenum. It is exceptionally strong, hard, and very light. It has a specific gravity of 8.29, which is much less than the specific gravity of pure gold (19.3), or of casting golds, which ranges from 14 to 18. Vitallium resists strong mineral acids, and a solution of sodium chloride of any degree of concentration produces no effect on it over any period of time. Vitallium is stronger and cheaper than gold; it can be boiled; and it lies inert in the body tissues. Any implant in the orbit certainly should be sterilized by boiling. Vitallium produces no tissue reaction, and it is not influenced by heat or by cold as are other synthetic and plastic materials. The author has used vitallium orbital implants for more than a year. In 6 cases there have been no complications and the cosmetic results have been excellent. LESLIE L. MCCOY, M.D.

MOUTH

Brown, J. B., and McDowell, F.: Secondary Repair of Cleft Lips and Their Nasal Deformities. *Ann. Surg.*, 1941, 114: 101.

In spite of care in performing the primary harelip repair to secure a good alar level and direction, a good nostril floor, a good nostril curve across the tip, a straight columella, a full lip border, a full vermilion, and a flexion crease across the lip, secondary correction of the lip and nose may be required. Both of these usually need correction and must be considered together in planning the repair. If possible, tissue already present is readjusted, but in extreme deformities tissue from elsewhere may have to be utilized. Several carefully planned procedures may be necessary, with initial emphasis on the gross restorations.

Some of the essentials in carrying out these procedures can be listed. Anesthesia can be obtained by either local block or infiltration, or by the intratracheal administration of ether. The incisions should be carried along those already present to open as few new areas as possible. In the readjustment, the vermilion border and the floor of the nose are good places to match the two sides and can be marked with 3 per cent methylene blue. The intranasal incisions are closed with chromic catgut, and the skin and vermilion with fine No. 000 silk sutures placed close to the incision. Forceps are not used in the skin.

The construction of a philtrum and cupid's bow is hardly feasible and any effort to do so may create additional scars and necessitate sacrifice of normal tissue. Occasionally, the Mirault flap may be too large and this can sometimes be corrected by the limited procedure of reducing the size of the flap without opening the lip completely. The lip which is retracted can be held forward with a dental prosthesis, which can often be built over and held on existing misplaced teeth. It may be necessary to insert free skin grafts in the upper buccal fornix to free the lip from the bone.

In the repair of double harelip, the use of the prolabium for the full length of the lip almost always

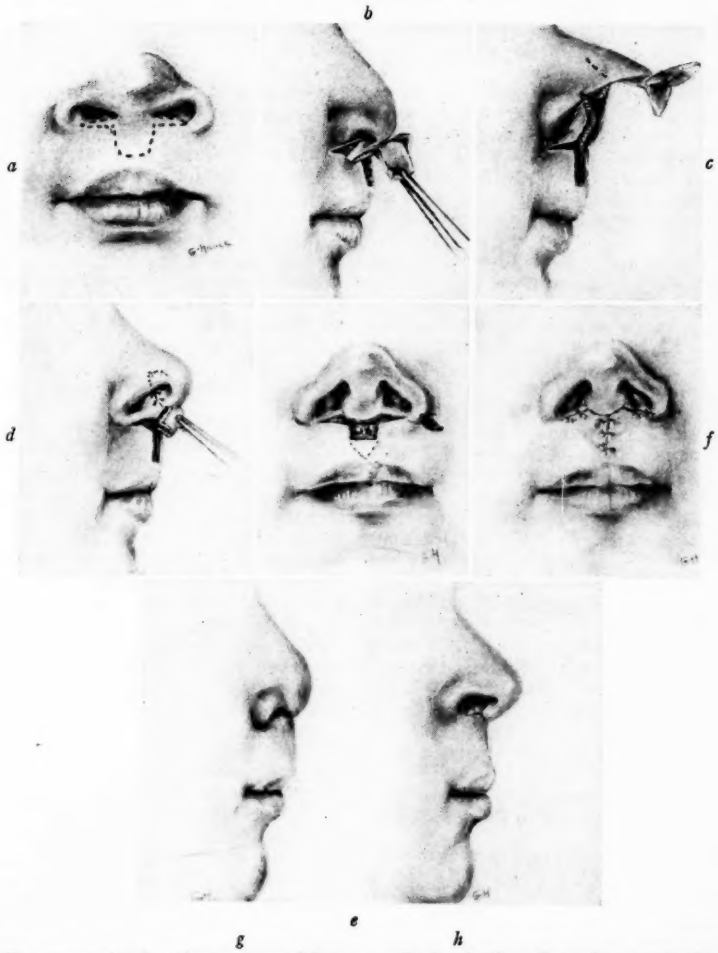

Fig. 1. Columella construction by advancement of flap from upper Lip: *a*, Design of continuous flap, with base at tip of nose, lateral triangles to fill opening in septum and to allow for shortening of lip. *b*, Flap dissected free. *c*, Tip and dorsum of nose loosened and freed from septum by incision up over top of septum. *d*, Flap being sutured in place, with full extent going along base of septum and small triangles from floor of nose going in along both sides just above septum. *e*, Flap in desired position at a right angle to lip, and not pulled back down in it. *f*, Lip closed by shifting it clear over to midline without putting sutures in new columella that will drag it back down in lip. *g*, *h*, Profile before and after advancement of lip flap for columella. (Courtesy of J. B. Lippincott Co.)

results in an ugly notch. When this situation is found or when too much lip has been sacrificed, a flap from the lower lip may be necessary. This procedure leaves a scar in the lower lip and an inert mass in the upper but is often the only way of correcting the disproportion in the two lips. The tendency toward forward protrusion of the jaw may be corrected either by partial resection of the jaw or by reduction in the size of the chin. Orthodontic methods are helpful in correcting the shape of the upper dental arch and the position of the teeth.

The repair of the nasal deformity is difficult because of certain molds, skin folds, borders, and delicate shadings of the normal nose, lip, and mouth. It is best to try to correct these deformities by the regular intranasal osteoplastic procedure of reducing the size of the nose and reconstructing the lower lateral cartilages. Only when the nose has been "slumped" badly for a long time will it be necessary to remove excess skin through external incisions.

The bony nose is corrected by removal of the dorsal hump, narrowing of the side walls with pos-

sible removal of a triangle of bone, and straightening of the septum (essentially the Joseph operation). The reconstruction of the lower lateral cartilages is carried out on both sides but with greater attention to the cartilage of the deformed side. The dome of the cartilage may be turned up to make a prominent medial crus, or the lateral crus may be anchored to the opposite cartilage over its own medial crus. The direction of insertion of the ala into the face can be improved only with external incision. An open floor of the nostril can often be corrected by local mobilization of tissue but may require shifting of tissue from the cheek at the junction with the ala. Should the airway be blocked, the septum can be resected or straightened at the same time, or as a separate step. Completely blocked nostrils are usually very difficult to restore and require free skin grafts after very careful opening dissection.

The secondary corrections in double clefts present a difficult problem. The columella is constructed by advancing part of the prolabium from the lip into a position below the septum (Fig. 1). The tip may have to be held forward with a costal cartilage implantation. If the columella is absent an arm or wrist flap may be necessary to replace it. Occasionally the prolabium is jammed backward and will obstruct the airway. This will necessitate excision of the obstructing mass and the possible grafting of raw surfaces in the nose.

The patients must be advised to control facial grimaces, loud speech, and other attitudes that call attention to the imperfections of their faces. They must secure jobs that do not require conspicuous appearance in the public eye. It is true that they are more apt to have children with similar defects but this is not universally true.

The authors illustrate many of the procedures.

BRADFORD CANNON, M.D.

Beck, H.: Fractures of the Temporomandibular Joint (Ueber das Frakturgeschehen der Kiefergelenkbrueche). *Ztschr. f. Stomatol.*, 1940, 38: 201.

Fractures involving the temporomandibular joint occur most often from indirect violence and in association with other fractures of the mandible. The characteristics of the individual fracture are dependent on the kind, force, location, and direction of the violence. For the occurrence of a fracture-dislocation, the position of the mouth, whether opened or closed, is of significance. The author differentiates with Wassmund the perpendicular (longitudinal), the transverse, and the oblique fractures of the mandibular neck. The latter are the most common form of fracture and occur as a result of violence from in front against the chin and in the direction of one or both mandibular joints. Finally, splintering or shattering fractures sustained through gunshot wounds are mentioned.

In contrast to other observers, in the oblique mandibular fractures the author most frequently observed dislocation of the small fractured fragment to the outside. At the moment of fracture, because of the anatomical form of the joint body, it is rotated laterally and it remains in this position. The individual form and length of the joint body, the breadth of the muscular insertions, the age of the patient, and the presence of teeth in the jaw play as great a role as the cushioning, yielding, and elasticity of the condyle. Subluxations are the most frequent in fracture-dislocations of the condyle. For their occurrence severe and usually direct violence against the joint is necessary.

In agreement with Wassmund five types of dislocation are differentiated. These are illustrated in the original article with roentgenograms. Joint fractures in children are rare, whereas fractures of the horizontal ramus and of the alveolar process are common. The explanation of this fact lies in the physiological elasticity of the bones in childhood.

(VON BRANDIS). JOHN L. LINDQUIST, M.D.

Jacobs, M. H.: Malignancies of the Oral Cavity. *Am. J. Orthodont. & Oral Surg.*, 1941, 27: 253.

Malignancies of the oral cavity may be divided into those which occur in the lips, tongue, floor of the mouth, cheeks, salivary glands, and jaws. Epidermoid carcinomas constitute 98 per cent of the malignancies found in the oral cavity. The remaining 2 per cent consist of adenocarcinoma, carcinoma adenoides cysticum, and basal-cell carcinoma. Mixed-cell tumors and adamantinomas must also be considered potential malignancies; the former because following excision they may become malignant; the latter because of their tendency to marked local destructive processes and infiltration into the surrounding soft tissues and lymph nodes.

The treatment of precancerous lesions is an important factor if malignancy of the oral cavity is to be prevented. Papillary and fissural leucoplakia of the mucous membranes of the mouth should be surgically or electrosurgically removed. This is more urgently indicated when there is a history of malignancy in the immediate family of the patient, because more and more evidence of a hereditary diathesis or predisposition to malignancy is being accumulated in the literature. That tobacco smoking in any form, or tobacco chewing, is influential in forming leucoplakia as well as definite malignancy can no longer be questioned. The number of cases presenting malignant lesions in the mouth because of long-continued irritation due to carious teeth and ill-fitting crowns and bridgework is not coincidental.

Epidermoid carcinoma of the tongue in its early stages is generally restricted to one side, when the base is not involved. When the base is involved, it spreads to all parts of the tongue and surgery is of no avail. If the tip is involved, it also spreads to all parts of the tongue, which indicates the importance of early treatment. Involvement of the border of the tongue results in spreading to the floor of the mouth. Metastasis to the lymph nodes in epidermoid carcinoma varies. In some cases involvement takes place early, while in many advanced cases there is no involvement.

Adenocarcinoma occurs most commonly in the salivary glands and in the cheeks. At first the tumor is encapsulated, but very quickly it breaks through the capsule. The local lesion may be quite small, but metastasis to the lungs or other organs can often be demonstrated. Mixed-cell tumors occur in the salivary glands, palate, and buccal mucosa. Most of these tumors are encapsulated, but many are fused with the structures of the salivary glands. The encapsulated forms of the tumor are usually extraglandular.

Small mixed-cell tumors may remain quiescent for a number of years before they show active and invasive growth. Many of these tumors contain offshoots from the mass itself, in the form of small nodules. This may account for recurrences even when it was believed that the entire tumor had been extirpated. Mixed-cell tumors are potential malignancies and must be treated as such. If there is any uncertainty of total extirpation, radium or x-ray treatment should be used.

Adamantinomas are solid or cystic growths occurring in the jaws with local malignant tendencies. They form a cavity within the alveolar borders, and gradually expand them. When the capsule ruptures, the tumor invades the surrounding tissues. An adamantinoma may break through the floor of the antrum and invade it to such an extent that exophthalmos may be produced. Recurrent adamantinomas sometimes develop into adenocarcinomas and epidermoid carcinomas. The greater the number of recurrences, the more chance that cancer may occur.

There are three accepted methods of treatment for oral malignancies: irradiation with x-ray or radium, irradiation followed by surgery, and surgery followed by irradiation. The method of choice depends upon the size and location of the tumor. Early malignancy can best be cured by surgery followed by x-irradiation. Advanced carcinoma of the base of the tongue is best treated by x-ray treatment or radium implantation. When deforming operative procedures seem necessary, x-irradiation has proved more successful.

True adamantinomas respond to surgery followed by careful and thorough cauterization. When biopsy reveals the adamantinoma to be undergoing transitional changes into carcinoma, surgery must be followed by x-irradiation. X-irradiation alone for adamantinoma has not proved successful in the author's cases.

When surgery is resorted to in the treatment of oral malignancies with palpable cervical glands, block dissection of the cervical lymph nodes must be performed. Whether extirpation of the lesion and neck dissection should be done in one operation depends upon the age and condition of the patient. It should be left to the judgment of the operator. There is a greater tendency at this time to perform the block dissection of the glands some time following the removal of the local lesion.

JOSEPH K. NARAT, M.D.

Thoma, K. H.: Rhabdomyoma of the Tongue. *Am. J. Orthodont. & Oral Surg.*, 1941, 27: 235.

Rhabdomyomas occur in the oral cavity, and, like leiomyomas, are rare. They occur at any age and may be congenital. In acquired tumors, there is generally the incidence of trauma to be considered: patients remember having bitten the tongue and connect the injury with the onset of the tumor. Such information, of course, is not always very reliable.

The tumors generally form a hard, circumscribed, slightly elevated nodule somewhat lighter in color than the surrounding mucosa. In rare instances they extend from the surface and are pedunculated; their size varies between that of a pea and that of a pigeon's egg. They grow very slowly and are generally benign in character, although several reports state that they recurred after excision. This is not surprising when one considers that they are not encapsulated. In isolated cases the tumor formed metastases.

Excision is indicated either by means of the scalpel or endothermy knife. If the tumor is benign and excision is complete, there should be no recurrence. Because of the cases in which an epithelioma developed from the surface epithelium, it is important to recognize such a condition promptly, and either perform a more radical excision or follow up with x-ray irradiation.

A new case of a rhabdomyoma of the tongue is reported by the author. The tumor was made up of the granular type of cells which some investigators have believed to be degenerated muscle fibers, but which Diss identified as atypical myoblasts. The patient was a woman thirty years old.

JOSEPH K. NARAT, M.D.

NECK

Kartavin, V. A.: Malignant Tumors of the Thyroid Gland. *Nov. khir. arkh.*, 1940, 47: 137.

Of 11 patients with malignant tumors of the thyroid gland observed by the author, 5 were men and 6 women. In 3 cases an adenoma with metastases was found; in 2, a malignant papilloma; in 5, carcinoma; and in 1, sarcoma. In 6 cases a definite diagnosis was made before the operation, while in 3 other cases malignancy was strongly suspected. Six patients were less than forty years of age. The tumor was removed in 7 patients. The operation was followed by deep x-ray therapy. Of the 7 patients who were operated upon, 3 were still alive after three years.

The author maintains that malignant tumors of the thyroid gland develop most frequently in a preexisting goiter. JOSEPH K. NARAT, M.D.

Chaikoff, I. L., Entenman, C., Changus, G. W., and Reichert, F. L.: The Influence of Thyroidectomy on Blood Lipids of the Dog. *Endocrinology*, 1941, 28: 797.

In these experiments, blood-lipid determinations were made after excision of thyroid tissue in the dog.

An inverse relation between thyroid activity and blood lipids has been repeatedly observed, but the mechanism of this relation is unknown.

The levels of blood cholesterol, both free and esterified, phospholipids, and total fatty acids were compared in 10 dogs before and after thyroidectomy. These determinations were made frequently for as long as two hundred and fourteen days after excision of the gland. All dogs but 1 were maintained on a constant caloric intake.

It was found that although blood-lipid levels rose after thyroidectomy, the various lipid constituents responded differently, the most pronounced increases occurring in cholesterol and in total fatty acids.

The earliest and most striking changes occurred in cholesterol esters, in which 4 cases exhibited a 300 per cent increase over the highest pre-operative values. Significant changes were observed as early as seven days after excision of the thyroid glands.

In 7 of the 10 dogs, increases in the total fatty-acid content occurred after thyroidectomy, but the extent of the rise averaged only about 75 per cent over the pre-operative values. This rise occurred as early as one week postoperatively, with definite changes present in all 7 dogs at the end of one month.

Marked changes in the levels of free cholesterol or of phospholipids were observed infrequently after thyroidectomy.

The blood-lipid response to thyroidectomy was shown to be irregular and variable, which indicated an unstable blood-lipid level as a characteristic feature of the thyroidectomized dog. There was no uniformity regarding extent of rise, time of onset, maintenance of elevated levels, or degree of fluctuation. S. Lloyd Teitelman, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Guleke, N.: Should the Fresh Bullet Wound of the Brain Be Sutured? (Soll die frische Hirnschusswunde genaeht werden?) *Deutsche mil. Arzt*, 1941, 6: 1.

This is an old question. Langenbuch was in favor of the primary suture of bullet wounds of the brain; von Bergmann was against this procedure. However, Bergmann recommended it for those cases of complicated skull fracture associated with wounding of the brain. Also, he, even in his time advised the eventual shifting of skin flaps. During the World War Barany, Frey, Kaerger, and others favored primary suture. Even at the present time doubt still exists as to whether it is possible to remove primary infection from brain wounds to the extent that complete wound closure can be ventured, and one is still not completely clear as to the extent to which the operative care of the wound may be delayed without endangering of the healing process. The time period of six to eight hours, which is generally accepted as the time during which it is permissible to carry out primary suture after proper operative treatment of the wound, can frequently not be adhered to under conditions of war.

Thanks to the wise recommendations of the army physician, Kittel, a specially advanced station, outfitted with the necessary instruments was assigned to Guleke during the advance through the Maginot line, 15 km. behind the front, so that the wounded could be delivered to this station within five or six hours after injury; later on after the army had broken through the Maginot line, the distance of the station behind the front was increased from 80 to 100 km. However, the transports were so rapid that even then the majority of the wounded, about two-thirds, were brought to the station within twenty-four hours. If they did come later, it was for the most part due to the fact that they had been found in the field that much later. In one-third of the cases, the care of the wound took place within forty-eight hours. Even longer transportations were fairly well withstood as long as the patients had not been previously operated upon. This station, for the care of bullet wounds of the brain, remained at its original place as long as it was necessary to enable the very last of the inmates to be brought back to the homeland without any danger; this was about three months.

Guleke by no means operated indiscriminately. Twenty-two of the wounded had to be excluded from the very first because of the severity of their wounds. However, when he saw that he was able to heal some apparently hopeless cases by means of operation, he widened his operative indications and operated on 23 of such cases, but without success. The post-mortem findings revealed the reason for this; the destructive processes were too great. The character of the outer wound is not the deciding factor. Soiling of a greater or lesser herniation of the brain is *per se* no contraindication. In 2 cases he successfully performed an electrical débridement of the wound of the soft parts and brain during the first twenty-four hours after injury in the presence of a brain herniation that was already foul-smelling and necrotic. He operated upon almost all of the cases within the first forty-eight hours. However, he employed primary suture, in some exceptional cases, even three and four days after injury without experiencing any serious disturbances.

The suction technique with the water pump permits a much better cleansing of the bullet tract in the brain than all previous techniques. To be sure, in many instances a bone fragment may present itself, and only after the removal of the latter will the destroyed brain substance run out of the wound. In this respect it is interesting that Guleke, in these cases, in contradistinction to Schoenbauer and other neurosurgeons, does not think it necessary to do away with the careful digital palpation of the wound, if it is not possible to do so by other means, in order to remove bone fragments and foreign bodies from the wound. He was able to remove grenade splinters from fresh wounds with the electromagnet, whereas this procedure was unsuccessful in older wounds because even very delicate scars can offer a marked resistance to this instrument. The surface of the brain comes to lie at its normal level after suction has been applied, and the bullet tract lies open and gaping after all of the brain fragments have been removed. If this is not the case then it is necessary to apply further suction. Sometimes the brain surface will sink to its normal level, only when the bulging and, for the most part, markedly hyperemic edges of the wound have been widely débrided.

Sinus hemorrhages are frequent complications. The author saw these occur 10 times in 114 operative cases of gunshot wounds of the skull. He controlled these hemorrhages by means of a lateral suture because tamponade does not come into question in primary wound closure, and he did not think that hemostasis by means of muscle tabs seemed advisable because of the danger of infection. Injuries of the middle meningeal artery must sometimes be treated by means of a cigarette drain with a specially placed small opening in those cases in which the wound cannot be oversewn. Even injuries of the cerebral ventricles may heal in exceptional cases, but it is particularly in these cases that one must carry out a primary wound closure because tamponade would lead to secondary infection. The author always permits the dura mater to remain open.

Most careful hemostasis is necessary. This is followed by a three-layered suture of the soft parts.

The author widens the indications for operative care to cases of through-and-through bullet wounds, and penetrating wounds which are characterized by a small and, in many instances, completely agglutinated outer wound. He does not, as formerly, undertake operative procedures only when the clinical manifestations of a markedly elevated intracranial pressure force him to do so; rather, he operates routinely, even in these cases. It may happen, therefore, that he frequently deals with most minute shot splinters which, according to roentgen findings, have lodged in the brain at quite a distance from the wound of entrance and do not produce severe clinical manifestations.

In cases of penetrating or ricochet bullet wounds of the scalp in which the bullet remains lodged in the bone or the roentgenogram shows an indentation of the bone, the author, more frequently than formerly, exposes the lamina interna in order to inspect the dura mater. Even in the presence of a non-injured dura, there are frequently found large, contused areas in the brain which should be débrided if the wound is still fresh and shows no severe infection. In those cases which were complicated by associated opening of the orbit of the eye, ear, nose, and/or the paranasal sinuses, the author did not carry out primary closures but tamponed and treated these cases openly. He believes that only when one is dealing with a wound of the frontal lobe and there is present a wide avenue of drainage to the nose, could one venture a primary closure of the wound by suturing, because in these cases, tamponade yields uncertain results.

Eighty per cent of the patients admitted presented grenade and mine splinters, 20 per cent had infantry bullet wounds—60 penetrating wounds of the brain, 47 tangential wounds, 20 ricochet and penetrating bullet wounds of the bone, and 3 segmental bullet wounds; there were no true diametrical wounds. On the whole, 147 cases were treated with a mortality of 39.5 per cent. Among the dead, however, were 22 severely wounded patients who were admitted in a moribund condition. Eighty-one cases of open brain injuries due to bullets, almost all of which showed more or less large herniation of the brain, were operated upon. Of these, 3 ended fatally as a result of other injuries in spite of successful treatment of the skull wounds. Of the remaining 78, 35 or 44.5 per cent, terminated fatally. In 23 of these fatal cases, however, the post-mortem examination revealed such severe injuries that no operation could have helped them. The mortality in these cases, therefore, should not be considered in evaluating the operative procedure. Accordingly, only 55 cases remained for judgment, and of these cases, 12, or 21.8 per cent, ended fatally during the first few months following operation.

If one compares these mortality figures with those of the World War (Guleke 1918, from 45 to 55 per cent; Franz, 36.7 per cent), the 39.5 per cent mortality of the 147 cases treated by Guleke at this time does not show a great difference. Nevertheless. one should not use this statistical study for the purpose of deciding the question here proposed. This study can furnish only a comparison of the results obtained by the open treatment of these wounds and by primary suture, as employed in a group of completely or almost completely similar cases in which the operative treatment, aside from this particular point, was practically the same. However, a statistical study of this kind, in which open wound treatment was employed, is not available because the neurosurgeons of today are almost all in favor of primary wound closure. It should be stated, however, that 80 per cent of cures represents a remarkably good result. Naturally, one will be able to pass judgment on the end-results only after years have passed. In the meantime, the hope may be expressed that the smoother the course of healing, the fewer will be the delayed disturbances that may develop. On the whole, the impression obtained in all of the operative cases was an excellent one. Headaches and coma usually disappeared after two or three days, and after a few days most of the patients were completely free of complaints. Late symptoms and recurring symptoms, as a rule, subsided quickly. However, the immediate good results were disturbed at times.

First of all, necrosis of wound margins frequently developed from ten to fourteen days after operation, in most of the cases because of a too firmly tensed soft-tissue suture, or because of a poor blood supply to the skin in the cases in which shifting of skin flaps had been carried out. In most instances, even these healed slowly, without secondary infection of the brain. On the other hand, the disruption of the wound margins was more dangerous. This complication also depended, in part, upon technical mistakes, and upon increased intracranial pressure due to primary infection; in the latter cases there always developed a glazed, grayish, and frequently exudate-covered herniation of the brain, which in most instances gradually increased in size. This type of disturbance usually made its appearance from ten to fourteen days after operation, and occasionally after three or four weeks, in cases in which the healing process of the wound appeared to be completely smooth. The subjective and objective disturbances were remarkably light. Aspiration of the wound and spinal puncture were of no avail. It was remarkable that the brain herniation was by far not as marked as formerly when the cleaning of the wound by suction had not yet been introduced. In about one-half of the cases the herniation finally cleared up and became covered with epithelium. Eight patients died as a result of this complication. These cases are proof of the fact that, in spite of the modern treatment, one does not always succeed in becoming master of the primary infection.

After discarding those cases in which the patient died in spite of hopeless operations, Guleke employed the primary closing suture in 72 cases. Of these, 38 healed without the slightest wound disturbances while 20 showed mild superficial necrosis of the wound margin or suppuration of the missile tract;

therefore, in 58 cases, or 80.5 per cent, a generally undisturbed healing took place.

If one, however, takes into consideration the cases of open brain injuries which were almost always accompanied by primary herniation of the brain, then among 47 sutured wounds (8 cases were tamponed), there were 20 completely smooth convalescences and 14 with very minor disturbances, 34 cases, or 72 per cent. In 13 instances the wound reopened itself secondarily, and in 8 of these cases the patient died because of secondary infection. To this number should be added 3 other cases, in which the patients died as a result of severe injuries, but presented a suppurative meningitis at the very beginning; thus the mortality was 11 cases, or 22 per cent.

Infection of the brain wound. Disturbances of wound healing occurred in the patients who were operated upon after forty-eight hours, almost twice as frequently as in those who were operated upon during the first twenty-four hours. In any event one must say that at the present time the primary wound suture is superior to the open technique of wound treatment, if one is able to operate within the first two days. Disturbances are much less to be attributed to the suture than to an insufficient cleansing of the brain wound. The degree to which it is possible to clean infected brain wounds, even in delayed operations, depends upon the individual case. Foinius attained successful results in some cases by débridement, temporary tamponade, and subsequent plastic covering of the wound. However, even in the primary operations, the suture still remains a procedure which is permissible only when the patient can remain under the care of the operator for a long time.

(Franz). Harry A. Salzmann, M.D.

Woodhall, B., and Baker, T. W.: Pneumatocele Occipitalis. *Arch. Surg.*, 1941, 42: 858.

This is a case report of pneumatocele occipitalis, a very rare condition, for only 30 cases have been described in the literature. The particular group of cases to which the authors referred were pneumatoceles in the region of the occipital bone and mastoid, so that the title could probably be extended to pneumatocele occipitalis and pneumatocele supramastoidea.

A typical case is reported in great detail with accompanying photographs and roentgenograms, one of which is submitted here. The authors have then reviewed the literature, in which, as mentioned before, 30 cases were discovered. In these 30 cases it was noted that the condition occurred predominantly in the male, and 1 case was noted in a patient under twelve years of age. The pneumatocele occurred spontaneously in 16 of 24 cases; in 5 the significant history of otitis media obtained; and in 3 the characteristic mass occurred following trauma to the head.

The condition is essentially one in which there is an encysted mass of air between the skull and the pericranium, and also between the bone and the dura. In the case described by the authors the mass was noted in the patient's left occipital region, which, over a period of one year, became larger and larger until advice was sought. The mass was tympanitic to percussion, fluctuant, and painless. When the mouth and nose were closed and forced expiration was attempted, the mass increased in size and became tense. There was a definite pulsation synchronous with the pulse. The patient had complained of ringing and roaring noises in his ear for some considerable time, since the mass was first noticed. Neurological examination was negative. Roentgenograms of the skull revealed a lesion which resembled an epidermoid tumor.

At operation, the mass was found to contain air and pressure, and the lesion was traced down extradurally to the mastoid cells. A fascia transplant and bone wax were placed over the cells, and the defect was repaired by approximating the dura to the skull.

The underlying pathological process is that air escapes intracranially and subpericranially into the tissues through some communication between the mastoid cells and eustachian tube. This communication or fistula may occur spontaneously, through trauma, or following infection.

Adrien Verbrugghen, M.D.

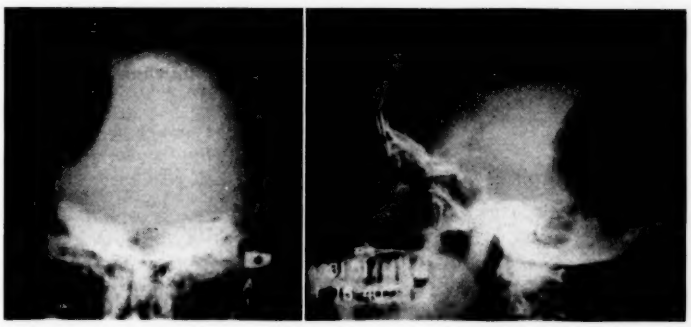

Fig. 1. A, left. Roentgenogram of a pneumatocele occipitalis. B. Another view.

SURGERY OF THE THORAX

TRACHEA, LUNGS, AND PLEURA

Brunn, H., Shipman, S., Goldman, A., and Ackerman, L.: Tuberculous Cavitation and Transpleural Decompression. *J. Thoracic Surg.*, 1941, 10: 485.

The authors point out that certain patients with tuberculous cavitation reacted poorly to compression, that their cavities enlarged rather than disappeared with such therapy, and that the chief factor in such cases was the presence of disease in the bronchus or bronchi draining the cavities involved.

They believe two of Coryllos' views to be true: (1) certain cavities form as a result of partial bronchial occlusion and this occlusion acts as a one-way valve which blows up structures distal to the block; and (2) cavities may heal by total occlusion of the draining bronchus.

The authors believe that the two factors producing a cavity in an elastic lung are (1) the presence of a caseous focus, and (2) the development of bronchial stenosis, which they believe is the result of an allergic tuberculous bronchitis rather than ulceration. This process is reversible and they have observed large cavities disappear very rapidly. Two patients with large tension cavities were treated by open drainage by producing a fistula by means of a skin flap. They are cured.

The authors have used the Monaldi procedure on 20 cavities in 18 patients. Three patients died. Two cavities are closed. One was treated by transpleural decompression and a skin flap, the other by transpleural decompression alone. Five additional cavities show secretions negative for tubercle bacilli, but the cavities are still open. In 1 case the cavity is still open, but the catheter has been withdrawn and the sputum is still negative.

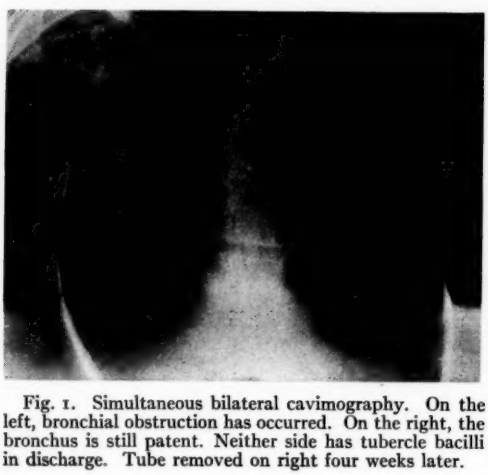

Fig. 1. Simultaneous bilateral cavimography. On the left, bronchial obstruction has occurred. On the right, the bronchus is still patent. Neither side has tubercle bacilli in discharge. Tube removed on right four weeks later.

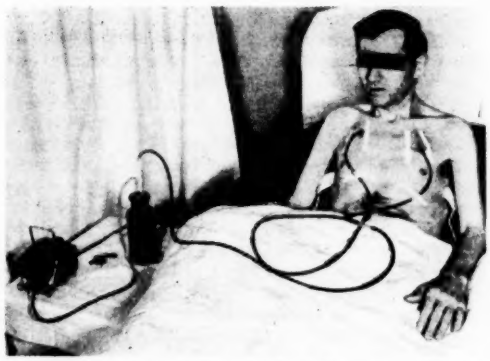

Fig. 2. Apparatus for transpleural decompression. Simultaneous bilateral motor suction using mechanical pump.

JULIAN A. MOORE, M.D.

Wolf, J. E.: The Possibilities and Prognoses of Suction Drainage of Cavities according to Monaldi (Ueber Moeglichkeiten und Aussichten der Kavernen-Saugdrainage nach Monaldi). *Schweiz. med. Wchnschr.*, 1940, 1: 600.

American investigators have produced evidence that the internal pressure of cavities is usually positive under normal conditions. As a result of the change of this positive pressure into a negative pressure by means of the suction drainage procedure, Monaldi was enabled to reduce the size of tuberculous cavities and gradually to bring them to closure.

In this curative mechanism the pericavernous atelectases play an important part. Surrounding the cavities there are zones of tissues with a vacuum or deficiency of air, which are of importance both in the spontaneous healing of the cavities and in the suction drainage. It is also certainly possible that certain emphysema-like changes take place under the influence of the negative pressure in the cavity with suction drainage. However, of special importance for the healing of the cavity is the behavior of the efferent bronchus. Under the influence of the continued suction there apparently finally results a displacement of the walls of the cavity with subsequent kinking of the bronchus.

This procedure is suitable especially for the larger isolated cavities, to which other procedures are not readily applicable. A special indication is present in giant cavities, which in numerous cases are finally successfully influenced or are reduced to such an extent that they become amenable to other interventions. Residual cavities in plastic lungs can also

be subjected to this treatment with great expectancy of success, as the author's own 2 observations show. The author has not as yet been able to achieve permanent healings. He emphasizes especially the immediate results, which are a decrease in the amount of expectoration and detoxication of the diseased body. The illustrations show a very considerable diminution of a giant cavity as a result of treatment for ten weeks.

(A. Brunner). Louis Neuwelt, M.D.

Vaschtschinskey, N. A.: Suppurative Pulmonary Processes. *Vestnik khir.*, 1940, 60: 499.

The author reviewed 125 cases of pulmonary suppuration. His findings may be summarized as follows: 86 per cent of the patients were men and 70 per cent of them were between twenty and fifty years of age. There were twice as many smokers as non-smoking patients. Thirty-two per cent had suffered from pneumonia, 30 per cent from influenza, 12 per cent from bronchitis, and 7 from pleurisy; in other words, only in 19 could no previous affection of the respiratory tract be detected. Pneumococci were present in 90 per cent, streptococci in 33 per cent, staphylococci in 13 per cent, fusospirillary symbiosis in 2.6 per cent, and various combinations of pathogenic micro-organisms in 56 per cent.

The results of physical examination are frequently not decisive and findings characteristic for a cavity cannot frequently be seen. The temperature curve is usually irregular. A low temperature does not necessarily prove a benign character of the process.

A large amount of sputum is suggestive of a suppurative process. Malodorous sputum was found in 81 per cent of the author's material. Particles of the pulmonary tissue were present in 18 per cent and elastic fibers in 50 per cent. A diminishing number of eosinophils and lymphocytes is a poor prognostic sign.

Roentgenological examinations are of greatest importance, especially those made by the so-called tomographic method. The author rejects exploratory aspiration, considering it to be dangerous.

As to therapy, the author was favorably impressed by limitation of fluids per os and postural drainage. With the exception of neosalvarsan and emetin, no internal medication gave dependable effects. In the early stages of a putrid suppuration, neosalvarsan is undoubtedly useful. Autovaccination therapy did not give encouraging results, nor did anti-perfringens serum come up to expectations. Blood transfusion may be considered only as a supportive measure. Novocaine block is not employed by the author. X-ray therapy was employed widely and furnished satisfactory results in 68 per cent, especially if the irradiations were not limited to a period of from six to eight weeks.

Surgical treatment is employed only in: (1) galloping types of the process, threatening a diffuse gangrene; (2) acute septicemia; (3) frequent recurrences; (4) repeated grave hemorrhages; (5) the presence of a large sequestrum of the pulmonary tissue located within the abscess cavity; and (6) peripheral location of the abscess.

Joseph K. Narat, M.D.

Ormerod, F. C.: Some Notes on the Treatment of Carcinoma of the Bronchus. *J. Laryngol. & Otol.*, 1941, 56: 1.

The author reports the results obtained in the cases of 33 patients with carcinoma of the bronchus who were treated with radon since 1937. Eighteen other cases seen during the same period were too advanced for treatment. However, in 2 of these, lobectomy seemed feasible and the patients were referred to thoracic surgeons. The ratio between squamous-cell and non-squamous-cell tumors was 2 to 1, and it is not possible to state whether one is more likely to respond to treatment than the other. If the bronchus can be opened up and the purulent secretions evacuated, treatment is considered practical. With toxic absorption reduced, the lung is given better aeration.

Biopsy was carried out in all cases and after a week the first application of radon was made. The present dose of 10 silver seeds charged with 3 millicuries of radon was inserted into the tumor at the attached portion, into the wall of the bronchus, or even through the wall into the infiltrated lung tissue. After a period of two months a similar dose was given and if indicated, from 20 to 30 additional millicuries of radon were given after another two months had elapsed.

The expectation of life previously reported for a series of 100 cases of carcinoma of the bronchus was seven and eight-tenths months, but with these 33 cases it was reduced to five and six-tenths months. However, since some were advanced cases, 5 patients survived for only one month after the insertion of radon, 7 survived for from seven to twelve months and were much more comfortable after treatment; 9 survived for more than one year; and 3 survived for more than two years. Among the cases previously reported, one patient is alive and apparently well after five years and another is apparently well after a period of eight years.

George A. Collett, M.D.

D'Agostino, M., and Parra, M.: An Experimental Study of the Production of Pleural Adhesions (Ricerche sperimentali sulla produzione delle aderenze pleuriche). *Ann. ital. di chir.*, 1940, 19: 971.

In operation on the thorax, particularly in drainage of the lungs, it is necessary for the pleural cavity to be absolutely closed off, and this can be accomplished only by firm adhesions between the folds of the pleura.

The authors describe experiments in bringing about such adhesions with the object of determining which are the best chemical agents for this purpose. The method used was extrapleural tamponing with gauze wet with different solutions. The animals used were 21 dogs divided into four groups. In the first group iodoform gauze was used, in the second group

iodoform gauze wet with various concentrations of a solution of Dial, in the third group simple gauze wet with aqueous solutions of lactic acid and sodium lactate, and in the fourth group simple gauze wet with aqueous solutions of bisodium phosphate.

The different methods were compared as to the extent of the adhesions and the promptness with which they were formed and microscopically as to the type and thickness of the adhesions, the reaction of the bed of the tampon, and the microscopic findings in the lung tissue beneath the tampon.

The best results were obtained with the tampon of simple gauze wet with solutions of lactic acid and sodium lactate. The adhesions obtained in this way were firm, they extended beyond the tamponed zone, and they were formed within four days; microscopic examination showed a firm fibrous tissue uniting the folds of the pleura. The second best results were obtained with iodoform gauze, and the third with simple gauze wet with bisodium phosphate. These gave moderate adhesions over only about a third of the tamponed zone. Histologically, the adhesions from the iodoform gauze showed a tissue rich in fibroblasts and there was only slight injury to the lung parenchyma and the tissues surrounding the tampon, while the adhesions from bisodium phosphate were made up of a loose fibrous tissue with large meshes and there was a marked degree of edema in the surrounding tissues and the lung parenchyma.

The poorest results were obtained with the Dial solution. The theory that it would increase permeability of the pleura was not confirmed. Either adhesions were not formed, or they were small in area and very loose, and when the solutions were very concentrated there was erosion of the parietal fold of the pleura. The adhesions were chiefly fibrinous with a histiocytic perivascular reaction and there was waxy degeneration of the intercostal muscles and intense exudation in the alveoli of the lungs.

AUDREY G. MORGAN, M.D.

HEART AND PERICARDIUM

Feil, H., and Beck, C. S.: Coronary Sclerosis and Angina Pectoris. *J. Thoracic Surg.*, 1941, 10: 529.

A follow-up study of 30 patients with coronary sclerosis and angina pectoris treated by the Beck operation is presented. The first patient was operated upon February 13, 1935, and the last April 19, 1938.

There were no immediate operative deaths, but there was a total mortality of 33⅓ per cent. Of the 20 living patients, 13 showed definite improvement. Their clinical symptoms were so changed that they could resume their previous occupations. Four patients showed moderate improvement, and in 3 there was no improvement.

The authors believe that the results justify limited application to human patients. The experimental evidence is good and the improvement in some of the patients has been almost incredible.

JULIAN A. MOORE, M.D.

THE PRESENT STATUS OF PERITONEOSCOPY

Collective Review

ARNOLD STARR, M.D., F.A.C.S., and HOWARD FRANK, M.D., Boston, Massachusetts

ALTHOUGH the diagnosis of intra-abdominal disease can usually be established by clinical, laboratory, and roentgen-ray investigation, certain intraperitoneal lesions have defied precise recognition by any measure short of laparotomy. The development by Ruddock in 1935 of a satisfactory instrument and technique for inspection of the peritoneal contents has provided a means of visualizing the surfaces of abdominal organs without recourse to operation. Ruddock's report, in 1937, of peritoneoscopy in 500 cases stimulated widespread interest in the possibilities of the procedure. Since his report, the method has been used in many medical centers and an extensive experience has accumulated. But while those familiar with peritoneoscopy have extended the indications for its use in some directions and narrowed them in others, many do not make use of the procedure at all. An appraisal of the status of peritoneoscopy, therefore, seems desirable at this time and will be made on the basis of the following considerations: (1) What does peritoneoscopy offer? (2) What are its limitations, hazards, and complications? and (3) Does it lend itself to easy and general applicability?

THE SCOPE OF PERITONEOSCOPY

The greatest usefulness of peritoneoscopy lies in diagnosis. Except for laparotomy, peritoneoscopic examination provides the only direct method of examining the peritoneal cavity and its contents. The presenting surfaces of the liver, gall bladder, stomach, omentum, intestine, pelvic viscera, and parietal peritoneum can usually be readily inspected. Additional information can be obtained by the use of a visceral retractor passed through another trocar. A lighted tube passed through the nose or mouth to the stomach for transillumination may permit the detection of mural tumors of its anterior wall. Permanent records of pathological changes noted can be made by photography.

The impressions gained by inspection can be confirmed and supplemented in certain instances by biopsy of small pieces of tissue which can be taken for histological examination. Solid tumor masses, growths on the surfaces of solid organs, and deposits on the omentum and parietal peritoneum are most safely biopsied. Lesions of the liver lend themselves especially well to biopsy because of their accessibility.

Although peritoneoscopy has been used to diagnose a large variety of abdominal lesions, and in many instances has yielded information otherwise not obtainable, its major usefulness is in answering certain specific questions, notably: (1) Is metastatic disease present especially in the liver? (2) Is ascites due to hepatic or peritoneal disease? (3) What is the nature of the enlargement of the liver or spleen or of another intra-abdominal mass? The advantages of the small incision, minimal operative trauma, small expense, and short hospital stay, all combine to make peritoneoscopy preferable to laparotomy for diagnosis in those instances in which the information required is not otherwise obtainable. It is well known that abdominal exploration in cases of carcinoma of the stomach with liver metastases entails a high mortality. When there is marked debility, it is especially worth while to avoid a fruitless laparotomy, particularly for ineradicable malignant disease. The examination of the liver to exclude metastatic malignancy is a proper preliminary to the radical excision of carcinoma of the gastro-intestinal tract. In patients who have undergone resection of malignant intra-abdominal disease in the past, the occurrence of a new illness may require the consideration of further surgery. The knowledge of whether or not the liver harbors metastases from the earlier lesion may be important in the decision as to course of action. There is a small group of patients who suffer from abdominal disease which cannot be clearly diagnosed, and in whom the severity of the illness does not warrant laparotomy; in these patients peritoneoscopy may contribute to the diagnosis. For example, inspection of the pelvic organs may reveal the cause of an ovarian dysfunction. Peritoneoscopy may be substituted for bimanual examination of the pelvic organs when vaginal examination is not desirable or possible. The use of peritoneoscopy, however, for random exploration as in cases of fever of unknown origin has not been found to be helpful.

From the Surgical and Peritoneoscopy Services, Beth Israel Hospital, Boston, Massachusetts.

Of primary importance is the reliability of information gained by peritoneoscopy. In a great measure this will depend upon the experience of the examiner. Several series of cases have been reported in which peritoneoscopic diagnoses have been checked by those made after operation or autopsy. In general, the accuracy of the peritoneoscopic diagnosis has been high, surpassing that attained by other clinical diagnostic methods. This is true particularly when pathological changes are visualized. The taking of an adequate biopsy increases the precision and accuracy of the examination. Peritoneoscopy cannot be depended upon to rule out the presence of any abdominal disease since only a limited portion of the abdominal cavity and its contents can be seen. Negative findings have limited weight.

Certain operative procedures have been done through the peritoneoscope. Adhesions have been severed, cysts tapped, abscesses drained, fallopian tubes occluded by coagulation, inguinal hernial rings sutured from within, and radiopaque media injected into hollow organs. The introduction of a second instrument through a separate incision is required to permit the performance of most of these operations under direct vision. These procedures are certainly more properly done by the usual surgical approach. In isolated instances, their performance through the peritoneoscope may be justified.

When used with the required experience and with an appreciation of what the method can and cannot do, peritoneoscopy has proved to be a highly accurate diagnostic procedure entailing a minimum of risk, inconvenience, and expense to the patient.

LIMITATIONS, HAZARDS, AND COMPLICATIONS OF PERITONEOSCOPY

An understanding of the limitations of peritoneoscopy will avoid the dissatisfaction with the method that arises from its indiscriminate use, and will lead to a proper selection of cases in which helpful information can be expected. Some of the limitations are inherent in the method, while others diminish with increasing experience. Only the anterior surfaces of the accessible viscera can be seen. Lesions involving the posterior aspects of these organs, and lesions of organs which cannot be seen at all, of course, cannot be diagnosed by peritoneoscopy. The presence of numerous abdominal adhesions may make a satisfactory examination impossible. Clearly, the significance of negative findings will depend upon whether the organ in question is in the field of vision. A complete abdominal examination cannot be made with the peritoneoscope. The extension, fixation, or mobility of tumors cannot be determined, hence the method should not be used to decide operability except when the presence of apparent metastatic lesions settles the issue. The absence of metastases on the surface of the liver does not exclude intrahepatic involvement.

Some experience is required to gain a correct visual impression because of the small field, the color changes produced by artificial light, and the distortion due to the lens system. Increased familiarity with the method minimizes the difficulties. Even a biopsy may be misleading. Small bits of tissue may not be adequate for correct interpretation by the pathologist. For example, a biopsy from the surface of the liver must necessarily include the subcapsular fibrous strands which have on occasion led to the erroneous diagnosis of cirrhosis. The taking of a biopsy through the peritoneoscope requires complete familiarity with the instrument and its manipulation, as well as an ability to orient oneself within the abdominal cavity and to recognize normal and pathological conditions. The removal of tissue for microscopic examination alone cannot be substituted for careful, systematic gross examination.

Unfortunately, the help which peritoneoscopy might offer in the differential diagnosis of acute abdominal lesions is distinctly limited by the danger that infection may be disseminated by the introduction of air under pressure throughout the peritoneal cavity. Its use in the diagnosis of ectopic pregnancy, however, may be an exception.

The widespread adoption of peritoneoscopy has been retarded by a fear of its dangers. When the examination is carefully performed, these hazards are largely theoretical, since in large series of cases reported the operative accidents have been strikingly few. Nevertheless, the possibility of serious complications does exist. Most of the accidents reported have been either perforation of the stomach or bowel, or hemorrhage. Perforation of the gastro-intestinal tract has occurred almost always as a result of fixation of the stomach or bowel to the anterior abdominal wall by adhesions. In all reported instances, the injury has been recognized and repaired immediately without mortality. Although in the introduction of the instrument, the trocar may inadvertently be pushed into a low-lying or enlarged liver or other solid viscus with resultant serious hemorrhage, bleeding is usually the result of biopsy, and the only death in Ruddock's series of 900 cases occurred from a biopsy of the liver which was followed by persistent hemorrhage. Electrocoagulation of the biopsy site will effect hemostasis.

The possibility of air embolism must be considered. Although not reported as a sequel of peritoneoscopy, fatal air embolism following pneumoperitoneum for the treatment of tuberculosis has been observed. Marked fluctuation of the blood pressure or vasomotor collapse have occasionally been seen in patients with cardiovascular disease.

The less important complications of peritoneoscopy are hematoma or sepsis of the abdominal wall, subcutaneous emphysema, transient shoulder pain, and persistent leakage of ascitic fluid.

THE GENERAL APPLICABILITY OF PERITONEOSCOPY

The ease of performance and general applicability of peritoneoscopy should be carefully considered when the decision for or against the adoption of the method is made.

There are very few patients upon whom peritoneoscopy cannot be safely performed. In fact, it is often reserved for the patient who is a poor risk and seems unable to withstand larger operative procedures. Very often these are people of advanced age. Frequently, peritoneoscopy may be applied in the elucidation of diagnostic problems in infants and children as well.

While the instrument is expensive, many institutions have found that the saving of hospital days soon repays the cost. The peritoneoscope needs the same kind of care and sterilization as the cystoscope, and since sterilization requires many hours, no more than one patient can be examined in one day with the same instrument. More rapid chemical sterilization may become feasible.

To avoid infection, rigid aseptic surgical technique is necessary. The usual preparation of the field should be done as for laparotomy. A source of contamination is the unsterile face, eye, or eyeglass applied to the eyepiece of the peritoneoscopic telescope. This can be avoided by shielding the eyes with sterile spectacles and adequate face masking. The pumping of unfiltered air into the peritoneal cavity apparently does as little harm as in an artificial pneumothorax or in encephalography.

Peritoneoscopy is best carried out in a fully equipped operating room which will afford the proper tilt table, suction, lighting, and trained assistance. Should an accident occur, laparotomy can be done with a minimum of delay.

In most instances peritoneoscopy can be performed satisfactorily under local infiltration anesthesia. An intravenous barbiturate will serve as a useful alternative. During the induction of pneumoperitoneum, the patient may have slight transient pain, but if the manipulations are gentle and if moderate pre-operative sedation has been given, there will be a minimal degree of discomfort. An occasional patient unsuitable for local anesthesia will require a general or spinal anesthetic. Young children should be examined under general anesthesia. In any case, a trained observer should keep a record of the patient's reaction to the procedure.

The introduction of the instrument requires no special training. The only points of the procedure which may offer some technical difficulty to the beginner are the insertion of the pneumoperitoneum needle through the abdominal wall into the peritoneal cavity, and the creation and maintenance of a good pneumoperitoneum. These mechanical problems are readily mastered with some little practice. Orientation within the abdominal cavity and the interpretation of what is seen are more difficult for the novice, and it is in these respects that experience in the use of the instrument is required.

Since the information obtained by peritoneoscopy increases with the experience of the examiner, it has usually seemed desirable to delegate this procedure to a special group. Some have believed that the endoscopist who performs bronchoscopy, gastroscopy, or esophagoscopy is best equipped, while others have recommended the urologist because of his experience with cystoscopy. Of major importance is the ability to recognize the gross pathology of abdominal disease, and in this respect, the general surgeon is best prepared. Certainly, he is best able to handle accidents should they occur. Complete endoscopic services are found in only a few of the larger medical centers, and there seems to be no reason to confine peritoneoscopy to those places. Any surgeon who desires to use the instrument can readily familiarize himself with the technique.

As is the case in the pioneer phase of any new approach to diagnosis, the initial enthusiasm for peritoneoscopy has resulted in its use for the diagnosis of a great assortment of abdominal lesions. Several therapeutic ventures have been undertaken through the peritoneoscope. At present, it would appear that many of the conditions for which peritoneoscopy has been done are more accurately and more easily diagnosed by other methods, and that the occasion for therapeutic operation through the instrument must be exceptional. It has been suggested that post-mortem peritoneoscopy might prove enlightening when an urgently desired autopsy is not obtainable. A

field of usefulness for peritoneoscopy not immediately related to clinical diagnosis but which may become significant is the opportunity provided for physiological investigation of the abdominal viscera in the intact unanesthetized subject.

In the future, a more widespread, but discriminating use of peritoneoscopy for the solution of special diagnostic problems may be expected. Within the limited scope of its usefulness, it should become an accepted and routine adjunct in diagnosis.

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SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Smith, D. W., and Bates, W.: The Surgical Significance of Pain in the Abdominal Wall. *Surgery*, 1941, 9: 741.

Abdominal pain due to neuralgia of the nerves supplying sensation to the abdominal wall is of extremely common occurrence. Various writers give different values for its incidence, but all students of the subject agree that it accounts for many obscure abdominal symptoms. Of 110 nurses examined, 36 per cent showed some spinal abnormality, and half of this group presented evidence of spinal-nerve root pressure or irritation which was demonstrated by hyperalgesia over the corresponding nerve distribution. A great number of grave intra-abdominal lesions may be simulated and correct diagnosis may save many needless operations.

The neuralgias are held to be due to postural traumatic injuries involving the nerve roots or to toxic manifestations of acute diseases caused by infections.

The diagnosis of abdominal-wall or parietal neuralgia is not difficult. Pain, being a purely subjective symptom, is less dependable than its objective manifestation, tenderness. The examiner's fingers should dip more or less deeply into the abdomen in order for the relaxed muscles to offer counter resistance to demonstrate the abdominal-wall tenderness. Further examination should be made with the muscles tense in order to protect the underlying viscera. The examiner should pinch or poke the skin, whereupon, in neuralgia, tenderness in the skin will be noted. The tenderness of an abdominal-wall neuralgia is unmistakable. It is unchanged over a voluntary tensed abdomen and is readily elicited by the pinch test. It usually extends over a greater area than the actual pain complained of, and may involve the entire distribution of the nerve. Regardless of the intensity of the pain, rigidity is usually absent as motor fibers are rarely involved.

Nerve block with 2 per cent procaine solution will clearly demonstrate the neuralgic character of the pain, and will frequently afford relief for weeks or months.

In considering abdominal neuralgia as a possible diagnosis of abdominal pain, one must be careful to rule out any possible intra-abdominal lesions. It would be far better to remove erroneously a normal appendix than to allow a gangrenous appendix to rupture. There is a definite risk, however, in any laparotomy, and all unnecessary ones should be avoided.

The treatment of the majority of these types of cases consists merely of the correction of postural defects, and of the usual medical management of a toxic or infectious condition.

JOHN W. EPTON, M.D.

Greco, A.: A Study of Mesocolic Hernia—the Intramesocolic Variety (Contributo allo studio delle ernie mesocoliche—varietà intramesocoliche). *Arch. ital. di chir.*, 1940, 59: 560.

There are two varieties of hernia of the transverse mesocolon, the one called transmesocolic, in which the opening extends through the whole mesocolon and the herniated loops of small intestine pass directly into the omental bursa, and the other called intramesocolic, in which the breach is through only part of the four layers of the mesocolon and the herniated intestine is covered with a cap made up of the other layers. The anatomy of the region is described and illustrated with diagrammatic drawings.

The author describes a case of the intramesocolic variety. This is much rarer than the other variety and only 7 cases have been described in the literature. The patient was a woman of twenty-eight who was found to be suffering with carcinoma of the stomach but had refused operation. She was suddenly taken with intense abdominal pain, and examination showed the signs of intestinal occlusion. Operation showed an opening in the transverse mesocolon through which about a meter and a half of small intestine had herniated and become strangulated. It was easily reduced and the opening sutured. The carcinoma of the stomach was found to be inoperable and the abdomen was closed. The patient made an uneventful recovery from the operation.

It may be possible to diagnose an internal hernia by roentgen examination, but the exact nature of the hernia can be determined only at operation. This may be a difficult task if the intestines are dilated with gas and displaced as a result of the hernia. A search must be made for the transverse mesocolon. This may necessitate evisceration of the small intestine. If the colon is lifted up the hernial ring can be seen. Reduction is generally easy, as the opening is apt to be large. After reduction the hernial ring is closed. Care must be exercised to avoid the vessel arches that run in the mesocolon, for if they are punctured by sutures it may cause gangrene of the colon.

AUDREY G. MORGAN, M.D.

Maingot, R.: The Floss Silk Lattice Posterior Repair Operation for Direct Inguinal Hernia. *Brit. M. J.*, 1941, 1: 777.

Maingot describes his modification of the posterior reconstruction operation for direct inguinal hernia, with floss silk instead of fascia lata, and a variation of the pattern of the darn. In this type of hernia the author neither disturbs the sac nor in any way attempts to ligate or invaginate it.

The object of the operation is to produce a solid, flat, uniform fibrous silk sheet to protect the whole of the posterior wall of the inguinal canal and at the same time provide a suitable aperture for the passage of the cord at a newly constructed and more laterally

placed internal ring. This is obtained by constructing a lattice with a 20 in. strand of floss silk threaded on a small curved round-bodied trocar-pointed needle. The cord is lifted upward and out of the way and the suture is introduced by taking a good bite of the deep aspect of Poupart's ligament, first of all at its point of insertion into the pubic spine, and then through the lateral tendinous fibers of the rectus muscle at its origin from the body of the pubis.

The end of the suture is not tied at this stage, but is left long and caught up in the jaws of an artery forceps. The suture is then continued in a lateral direction, i.e., toward the internal ring, by taking first a bite of the iliopectineal ligament, then of the shelving edge of the inguinal ligament (including Gimbernat's ligament), then a bite on each side of the cremaster, then of the conjoined tendon, and back again to the iliopectineal ligament and Poupart's ligament. Cooper's ligament is approximated to the innermost margin of the inguinal ligament to obliterate the femoral canal; this will guard against the possible subsequent formation of a femoral hernia.

When the femoral canal has been efficiently closed from above, the suturing is continued laterally, the conjoined tendon and internal oblique muscle being drawn over to the shelving edge of Poupart's ligament until the internal ring is reached. The stitches are placed almost vertical and side by side, and must not be pulled upon in such a way as to strangulate the tissues or to drag the inguinal ligament out of its normal alignment. When the internal ring is approached the cord is drawn firmly outward and slightly downward, and the upper and outer margins of the internal oblique are retracted upward and outward. The internal ring, or rather the *new* internal ring, should always be reinforced, and in placing it as far as possible from the external ring care should be taken not to compress the cord unduly at its point of emergence from the abdomen. This reinforcement is best carried out as follows:

The floss silk is knotted or locked on the curved edge of the internal oblique muscle, just above the reflected cord. It is carried transversely across above the cord, passed through the internal oblique muscle and locked, and then passed downward to pick up the edge of the inguinal ligament lateral to the cord. Lastly, 3 sutures are repeated in the reverse direction, being knotted or locked at each angle so that the emerging cord is buttressed and surrounded by a double ring of reinforcing floss silk. From this point the suture is carried toward the medial end of the canal with a wider transverse, the external oblique muscle or conjoined tendon being picked up and this structure being anchored to the inguinal ligament.

At the extreme medial point of the canal, the free end of the suture, after once again passing through Gimbernat's ligament, through the periosteum of the pubic spine, and through the dense fibers of the origin of the rectus muscle, is tied to the end which was left long and is steadied with artery forceps. The edges of the aponeurosis of the external oblique muscle are then sutured behind the cord, thus being placed subcutaneously. The wound is now closed.

J. M. MORA, M.D.

Campellone, P.: Results of the Operation for Inguinal Hernia According to the Method of Bassini Modified by Baggio (I risultati della operazione per ernia inguinale eseguita sul concetto di Bassini e col procedimento di Baggio). *Arch. ital. di chir.*, 1940, 59: 432.

Campellone states that Baggio's modification of Bassini's operation is in regular use at the clinic of Pisa. The modification includes:

1. Constant opening of the transverse fascia and its reconstruction as a plane by itself, as found in nature.

2. Utilization of the rectus muscle after opening its sheath: the opening is made along the lateral border of the sheath between the conjoined tendon and the transverse fascia. In this manner, the muscle is used to a greater extent and more radically than recommended by Bassini.

3. The conjoined tendon and the marginal remnant of the small oblique and transverse muscles are applied over the rectus muscle. Catgut sutures fix these tissues to the subjacent muscular plane and (like the rectus muscle) to the posterior border of the inguinal ligament.

4. Laterally to the rectus muscle, the plane is extended by means of a suture (extreme lateral suture); only the small oblique and transverse muscles are caught and the suture is passed through their full fleshy portion (not their lower inguinal bundles). The suture which follows medially catches together the inguinal bundles of these muscles superficially and the rectus muscle below; still more medially, the planes remain separated: the rectus muscle with four sutures in the deep plane, the inguinal bundles of the small oblique and transverse muscles, or the conjoined tendon superficially.

5. The sutures, which fix to the arch the rectus muscle and the small oblique and transverse muscles laterally to it, are silk sutures forming a vertical U, which embrace the whole arch to be tied outside it and insure a wide and resistant contact surface between the arch and the muscles.

6. The lower flap of the cremaster muscle obtained during isolation of the hernial sac is placed over the two muscular planes and fixed with three or four catgut sutures; the upper flap of the cremaster has been used with the mass of the small oblique and transverse muscles. The other steps are those of Bassini's operation.

Among 230 patients admitted with hernia, 200 were operated upon with Baggio's method: of these 189 had external inguinal hernias, 9 internal, and 2 external and internal combined; 181 had primary hernias and 19 had recurrences; 172 had simple hernias and 28 had complications in the form of strangulation. No recurrence of the hernia was found in any of these 200 patients on follow-up

examination: the time elapsed since the intervention varied from a minimum of six months to a maximum of four years. RICHARD KEMEL, M.D.

Di Molfetta, N.: A Contribution to the Study of Vasolacunary Femoral Hernia (Contributo allo studio dell'ernia crurale vasolacunare). *Arch. ital. di chir.*, 1940, 58: 177.

Di Molfetta reports 2 cases of femoral hernia, one unilateral and the other bilateral, in which careful examination left no doubt that the hernial sac was directly in contact with the bare femoral vein. He calls attention to the classification of femoral hernias into intravaginal and extravaginal and finds it irrational as long as anatomy has not definitely decided whether the femoral vessels have a common or an individual sheath, or a special anatomical formation which contains them. The opinions of the authors disagree on the anatomy of the femoral canal, the vascular sheath, and the femoral septum. Therefore, Di Molfetta has used the only sure method of studying the anatomy of the inguinal femoral region: he has made serial sections of 8 embryos, varying in vertex-coccyx length from 1 to 22.8 cm., of 1 newborn, of 1 child aged four years, and of 1 adult. The findings did not change with age, except for greater robustness assumed by the anatomical formations of the region, and can be summarized in the following statements:

1. The femoral canal is formed by the splitting up of the fascia lata into two leaflets which constitute, respectively, the anterior and the posterior wall of the canal (Fig. 1). The canal is filled with loose connective tissue, containing fat, which surrounds the femoral vessels, insinuates itself between artery and vein and forms a fatty cellular bed for the protection of the vessels. The leaflets of the fascia lata give off partitions which form a variable network in the connective tissue of the canal and serve to support this tissue, but without subdividing the canal into separate venous and arterial portions.

2. The femoral vessels are not surrounded by a proper vascular sheath, but only by the connective tissue of the canal, which tissue is a continuation of the connective tissue that surrounds the iliac vessels.

3. The transverse fascia, originating from the anterior abdominal wall, is inserted on the posterior border of the inguinal ligament and then behaves in a different manner medially and laterally. Medially, it is directed backward and upward and is inserted on the pubis, and thus forms the femoral septum; laterally, it continues downward toward the femoral vessels and disappears gradually at the back of their walls. This prolongation between the inguinal ligament and the walls of the vessels forms a recess filled with the connective tissue which is an extension of the preperitoneal connective tissue; this constitutes the principal anatomical factor in the predisposition to the formation of a hernia.

4. The hernia which occurs in this region and runs through the canal at the back of the vessels deserves the name of vasolacunary hernia. It plunges into the loose connective tissue which surrounds the vessels and gradually forces apart its meshes. The same formations, i.e. the walls of the lacuna and of the femoral canal, always surround the vasolacunary hernia. As the femoral vessels have no proper sheath, a distinction between an intravaginal and an extravaginal hernia is doubtful and cannot be accepted.

5. Clinically, four varieties of vasolacunary femoral hernia can be distinguished; they depend on the principal topographic relations to the femoral vessels: the prevascular and retrovascular, which are respectively in front and back of the vessels, and the medial and lateral, which are respectively in contact with the vein and the artery. These relations to the vessels may change during the evolution of the hernia, and depend on the separability of the space with which the hernia is confronted.

RICHARD KEMEL, M.D.

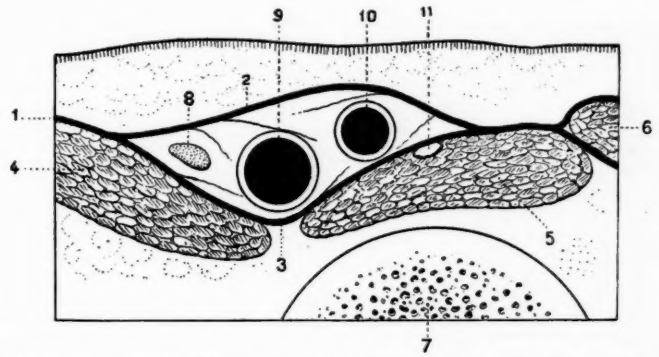

Fig. 1. Schematic drawing representing the transverse section of the lacuna of the femoral vessels in the adult: 1, fascia lata; 2, its anterior leaflet; 3, its posterior leaflet; 4, pectineus; 5, iliopsoas; 6, sartorius; 7, femoral head; 8, lymph node of Cloquet; 9, femoral vein; 10, femoral artery; 11, femoral nerve.

Beling, C. A.: The Selection of Cases for Peritoneoscopy. *Arch. Surg.*, 1941, 42: 872.

Apparently, peritoneoscopy has not received the attention to which it is entitled; for this reason, the author has gone to a great deal of trouble to express very clearly its indications and contraindications. He believes that if these were better understood, the correct use of the peritoneoscope would bring about more accuracy in diagnosis and more correct treatment. Many operative procedures would be avoided and much less morbidity would be encountered. This, then, is a plea for the considered and practical use of the peritoneoscope by those familiar with its use.

INDICATIONS FOR PERITONEOSCOPY

The use of the peritoneoscope is indicated for the following conditions:

1. Non-inflammatory disease of any of the organs within the greater sac of the peritoneal cavity, excluding the contents and borders of the lesser sac, the pancreas, the kidneys, and other retroperitoneal structures, with certain exceptions.
2. A pancreatic growth, particularly one interfering with the continuity of the common bile duct, or one suspected of metastasis.
3. A retroperitoneal mass (for determination of the location of an intra-abdominal mass with relation to the peritoneum).
4. A suspected neoplasm or anomaly of any of the pelvic organs, including endometriosis.
5. Old chronic inflammatory disease of any of the pelvic organs.
6. Suspected ectopic pregnancy.
7. Splenomegaly or hepatomegaly.
8. Ascites not of cardiac origin.
9. Tuberculous peritonitis.

CONTRAINDICATIONS FOR PERITONEOSCOPY

The use of the peritoneoscope is contraindicated in the presence of:

1. Any acute inflammatory disease of the abdominal cavity.
2. Pneumonia, pulmonary abscess in an advanced stage, or disease of the pleura.
3. Advanced pulmonary tuberculosis.
4. Any disease or lesion in the thorax extending into or communicating with the abdomen.
5. A stab wound or bullet wound of the abdomen.
6. Intestinal obstruction or advanced distention of either the small or the large intestine.
7. Acute perforation of any viscus.
8. Heart failure or cardiac decompensation in the absence of ascites, and in the presence of ascites except in certain specially selected cases.
9. Extensive operative scars and adhesions thereto.

From these indications and contraindications it appears that peritoneoscopy is a great diagnostic aid to the clinician. The author goes on to mention in particular the kind of cases in which the use of the peritoneoscope is indicated, and in each case, case reports are offered to show the value or lack of value that the instrument has in that particular group of cases.

For instance, in neoplasms of the stomach, it is often extremely difficult to determine the presence or absence of metastases in the liver without exploratory laparotomy, but Beling points out that in no way can laparotomy, especially exploratory laparotomy, compete with peritoneoscopy, because peritoneoscopy is entirely a diagnostic procedure whereas exploratory laparotomy should be employed almost entirely for therapy and very rarely, if at all, for diagnosis. Certainly if diagnosis can be obtained by other means, exploratory laparotomy is unwise.

From the point of view of the peritoneoscopist, neoplasms of the stomach should be divided into two groups: those in which obstruction is likely to occur, and those without obstructive lesions. In the first group, of course, peritoneoscopy is of no value whatever because operative procedures will be required to remove the obstruction or obstructive symptoms. However, those without impending obstruction fall into an entirely different category. In the second group, the question of operability depends on the presence or absence of metastases and, to some extent, on the presence or absence of fixation of the organ. Ruddock, in describing the results in 900 cases subjected to peritoneoscopy, reports approximately 90 per cent accuracy in recognition of metastases to the liver with the peritoneoscope.

Most neoplasms of the colon compromise the continuity of the alimentary canal, and, therefore, peritoneoscopy is not indicated because operation must be undertaken for the impending obstruction. There are rare cases, however, in the cecum in which it would be wise to know first whether there are metastases in the liver before any operative procedure is carried out.

The differentiation between hepatic congestion, biliary obstruction, and cirrhosis is important, and often it is difficult to determine whether a new growth in the liver is primary or secondary especially in the absence of a demonstrable neoplasm elsewhere in the body. The use of the peritoneoscope in cases of this kind helps materially. Peritoneoscopic examination is definitely not indicated for abscess of the liver, for it cannot determine the nature of the abscess, the organism present, or the likelihood of extension into the pleural cavity. Penetration into the abscess to recover contents is out of the question. A great deal of information with regard to the biliary tract may be obtained with the peritoneoscope, although the instrument should never be used in the presence of acute inflammatory disease. The use of the instrument, also, makes the taking of biopsies from the various organs possible, and, especially in the case of the liver, the histological study of such specimens may lead to the correct diagnosis and the proper treatment. The diagnosis between cirrhosis of the liver and carcinoma of the head of the pancreas is often difficult, and here again visualization of the organs may be

very helpful. A large cyst of the pancreas may be seen, but the instrument is not of value in determining other diseases of the pancreas.

With regard to the spleen, visualization of the spleen is often difficult, but for practical purposes it is often possible to determine whether a lesion is attached to the spleen or whether it is retroperitoneal; thus the proper method of surgical approach will be indicated. The instrument can be used to differentiate between intraperitoneal and retroperitoneal masses, which is of great practical value to the surgeon before operation.

In obscure cases of growth in the pelvis, or suspected pelvic growths, peritoneoscopy may be of great importance. For instance, rare cases of papillary cyst adenoma of the ovary may be seen, and it may be determined whether the condition has remained local or not. Endometriosis may be observed by visual examination, and this examination may determine the amount of involvement of the anterior wall of the rectum and disclose the amount of endometrial tissue in the pelvis. In 1 instance, in an elderly woman with a large ovarian cyst, it was possible to tap the cyst under direct vision through the peritoneoscope.

It is suggested that all hermaphrodites be subjected to peritoneoscopy before plastic reconstruction of the external genitalia is considered.

Ectopic pregnancy is very accurately determined by this means.

In the past, the diagnosis and treatment of tuberculous peritonitis has been unsatisfactory. The diagnosis was usually made by performing an exploratory laparotomy, and at the time of the laparotomy the air was introduced into the interior of the abdominal cavity. Through the peritoneoscope it is possible to inspect the abdominal cavity thoroughly, a biopsy specimen can be taken, and a definite diagnosis of tuberculous peritonitis can be made; and it is possible to introduce air under tension into the abdominal cavity at the same time.

The diagnosis of abdominal ascites is often difficult, and paracentesis does not solve the problem. Those who are familiar with the visualization of the interior of the peritoneal cavity are extremely sceptical about the clinical accuracy of the diagnosis in many cases of ascites. It would appear more rational, instead of performing paracentesis, to perform practically a similar operation with the peritoneoscope with the hope of getting accurate information as to the cause of the ascites. It is also possible to remove the fluid and to obtain biopsy specimens from different levels within the abdominal cavity. Thus, it would appear that peritoneoscopy should be performed first to establish a diagnosis, and from then onward, if it is deemed proper, paracentesis should be used. According to the author, it is not justifiable to perform paracentesis before the diagnosis has been definitely established with the peritoneoscope.

The purpose of the article, as can be seen, is to bring before the medical profession the value of this instrument so that its use may be extended, especially in the proper direction. The author believes that the use of the peritoneoscope has been neglected principally because its advantages have not been appreciated by the medical profession.

ADRIEN VERBRUGGHEN, M.D.

Biondo, A.: Peritoneal Absorption. Absorption of Granular Substances (Contributo allo studio dell' assorbimento peritoneale. L'assorbimento di sostanze granulari). *Arch. ital. di chir.*, 1940, 59: 172.

Von Recklinghausen first demonstrated that the peritoneum has powers of absorption. As to the details of this process there has been considerable controversy. Some have claimed that there is absorption through peritoneal stomas, but most investigators have denied the existence of such stomas. Some state that only the diaphragmatic portion of the peritoneum has this power of absorption; others report various zones of absorption in the peritoneum. There is also a difference of opinion as to whether the substances enter the lymphatics or the veins after absorption.

The author proceeded to study the problem experimentally. In his originally devised technique he used graphite as the foreign body. This he imbedded in gelatin which was solidified by cold, and was then localized to some part of the peritoneum by a purse-string suture which kept the gelatin block in place. This maneuver avoided the action of intra-abdominal currents and respiration.

The author studied absorption particularly in the anterior peritoneum, the omentum, and the pelvic peritoneum. He used a series of 12 dogs for these experiments. He opened the abdomen of different groups on the tenth, twenty-fourth, fortieth, and forty-eighth days after introducing the graphite material. The peritoneum so removed was studied by the usual histological methods. The protocols of the various experiments are presented in detail with numerous photomicrographic illustrations.

The author concludes that the granular substances traverse the peritoneum through the intercellular spaces of the endothelium. Physical factors such as pressure differences in the lymphatics aid the entrance of the granular substances into the lymphatic vessels, by an aspiration-like action. The same physical factors aid their entrance into the capillaries of the vascular system. The granules thus enter the lymphatics and the blood vessels both as free granules and as phagocytized granules. The same process was observed in all parts of the peritoneum which were studied (parietal, omental, and pelvic). Neither intestinal peristalsis nor respiratory activity plays any part in this process. Such movements may at times induce an ascending current which transports intraperitoneal foreign substances toward the diaphragm.

The author has also successfully demonstrated that the diaphragmatic peritoneum is not the sole peritoneal zone wherein absorption may take place.

JACOB E. KLEIN, M.D.

Vitkin, S. F.: Prophylactic Treatment of Postoperative Diffuse Peritonitis with Vaccines. *Nov. khir. arkh.*, 1940, 48: 64.

To study the efficiency of prophylactic injections of colon bactragen or vaccine in the prevention of postoperative diffuse peritonitis, the author used 62 rabbits. Three cubic centimeters of a filtered emulsion of human feces, diluted 1 to 10, were injected intraperitoneally. Of 62 rabbits, 52 were given preliminary intraperitoneal injections of 4 c. cm. of the vaccine suspended in 12 c. cm. of a 1 per cent solution of gum tragacanth. Each cubic centimeter of the vaccine contained 500,000,000 bacteria. The immunization of rabbits with the vaccine, with a successive intraperitoneal introduction of a fatal dose of feces, was followed by a clinical recovery in 73.1 per cent of the cases. Pathologico-anatomical studies revealed encapsulated peritoneal and omental abscesses.

In the remaining 26.9 per cent of the cases an acute diffuse peritonitis led to a fatal outcome, at an average of four days after the artificial infection. One hundred per cent of the control animals perished, at an average of eighteen hours after the introduction of the infectious material into the peritoneal cavity.

The immunization of the rabbits with the vaccine was never followed by untoward results and caused a rise of the relative and absolute number of neutrophils in the peritoneal exudate. The intraperitoneal introduction of an emulsion of feces at the height of the rise of neutrophils, caused by the vaccination, was followed by a clinical recovery in not less than 96.3 per cent of the cases, while recoveries were recorded in only 48 per cent when the emulsion was introduced at the moment when the percentage of neutrophils was lowest.

The beneficial effect of immunization may be ascribed to a great extent to a delayed absorption of the infectious material from the abdominal cavity and to the phagocytic action of the neutrophils present in the peritoneal exudate.

JOSEPH K. NARAT, M.D.

Schmidt, E. R., Curreri, A. R., Hidde, F. G., and Adashek, E. P.: Peritoneal Vaccination, Irrigation, and Chemotherapy in the Treatment of Experimental Peritonitis. *Surgery*, 1941, 9: 871.

In an extended series of experiments carried out on a group of dogs, the authors sought to determine the difference in mortality rate in peritonitis induced by perforation or gangrene of the cecum, as compared with that in peritonitis due to perforation of the distal ileum. In addition, they set out to ascertain the effectiveness of peritoneal vaccination toward subsequent peritonitis, and the therapeutic value of peritoneal irrigations and chemotherapy in peritonitis.

The results of their experiments demonstrated that it is practically impossible to obtain a mortality of over 50 per cent in peritonitis induced by cecal perforation, whereas ileal perforation produces a mortality of 93.33 per cent, thereby closely approaching the 100 per cent mortality reported by other investigators. Perforation of the distal ileum in their experimental work with dogs produced a peritonitis with a diverse bacterial flora such as is seen in human beings following gastro-intestinal perforation. With the ensuing high mortality rate as a basis of measurement, it was possible to estimate the value of therapeutic or prophylactic procedures that were tried in the subsequent experimental work.

Peritoneal vaccination has been used by Steinberg as a prophylactic procedure against peritonitis when peritoneal contamination seemed likely to occur during or after gastro-intestinal surgery. The commonly used antigen is coli bactragen, which is a suspension of formalized colon bacilli in gum tragacanth and aleuronate. The agent increases the local peritoneal resistance, and its action is nonspecific, since the protection it affords is not limited solely to the bacillus coli but extends also to other bacilli. Other agents have been used but colon-bacillus suspension appears to be the most effective. The authors, in their experimental work with dogs, found that peritoneal vaccination with colon bactragen prior to the operative production of ileal perforation protects against subsequent peritonitis when given from twenty-four to seventy-two hours before the operative procedure. Other investigators have obtained similar results. The effect of the vaccine is to produce a sterile peritoneal exudate rich in phagocytes, and capable of combating an infection in its early stages and subjugating it before an overwhelming bacterial growth can occur. Local tissue changes, such as edema and congestion, also prevent marked invasion of the tissue by bacteria. This inflammatory defensive device is a stage ahead of the bacterial offensive action following vaccination.

Peritoneal irrigation in the treatment or prophylaxis of peritonitis is a procedure arising from an older school of thought. French and German surgeons often wash out the peritoneal cavity with liberal amounts of water or saline solution before closure of each laparotomy, as a prophylactic measure, and also use this as a therapeutic procedure. Some investigators have used antiseptic solutions as peritoneal irrigants and have noted some improvement over the controls. The authors of the present article have found no advantage, either mechanical or chemical, to be gained from peritoneal irrigation in the treatment or prevention of peritonitis. In the first place the peritoneal irrigants do not reach all surfaces, and often even remove protective agents in the exudate as well as any bacteria or their toxins. Besides this, those bacteria or bacterial toxins that have invaded tissues or lymphatic and hematogenous channels are not reached by the irrigations.

Among the chemotherapeutic agents used by the authors in their experimental work were sulfanilamide, neoprontosil, promine, and related drugs. They were shown to be bacteriostatic, thereby favoring physiological immunity reactions necessary

to combat the invading bacteria. These drugs are most effective against certain hemolytic streptococci, and the bacillus coli and bacillus welchii, the two organisms most commonly found in any case of peritonitis following gastro-intestinal perforation. The experimental work tended to show that the earlier the drug is given in the course of an infection the better are the results obtained.

MATHIAS J. SEIFERT, M.D.

Lattanzio, R.: An Experimental Contribution to the Treatment of Peritonitis Due to Perforation (Contributo sperimentale alla cura delle peritoniti da perforazione). *Arch. ital. di chir.*, 1940, 59: 54.

Lattanzio has made an experimental study on 25 rabbits to determine the usefulness of capillary drainage in acute generalized peritonitis which was induced in the following manner: the animals were laparotomized, a perforation having a diameter of about 1.5 cm. was made in the free border of the large intestine, fecal material was expressed from the intestine into the peritoneal cavity, and the abdomen was closed. Acute generalized peritonitis resulted in every case. The animals were divided into three groups: two of 9 animals each and one of 7 animals. Four or six hours after the first intervention, the abdomen was reopened, the perforation sutured, the peritoneal cavity cleansed, and the abdominal wall completely closed in the first group; in the second group pure or diluted cod-liver oil was introduced into the peritoneal cavity before the closure of the abdomen. Six hours after the first intervention, the operation performed in the first group was repeated in the third, but capillary drainage was provided through the abdominal wall. All animals of the first two groups died and 4 of the third group survived.

There cannot be any doubt as to the efficacy of the drain in conveying the infected peritoneal exudate to the outside: in the 3 animals dying in the third group, the drain was soaked with exudate, hardly any of which was found left in the peritoneal cavity. In all of the drained animals, the internal layers of the dressing were saturated with exudate, while the external layers were dry, excluding any extraneous cause of wetting. The drains were removed on the third day and it was found that the discharge then tended to disappear and that the general condition of the animals improved at the same time. The survival of the 4 animals in the third group cannot be attributed to an attenuation of the peritonitic process; in fact, they were placed in a more disadvantageous position than some rabbits of the first and second groups, in which only four hours were allowed to elapse between the two interventions. In addition, all animals were operated upon with the same technique, and the presence of hemorrhagic exudate and of feces, together with the aspect of acute diffuse peritonitis, was found in every case at the second intervention. The time of survival after the appearance of peritonitis was shortest in the first group, slightly higher in the second, greater in the rabbits which died spontaneously in the third group, and practically unlimited in those which were sacrificed. No extensive adhesions were found in the drained group; necropsy of the 4 surviving animals killed at varying intervals showed that the thickness and extent of the adhesions decreased with the increase in time elapsed since the beginning of the peritonitis. This confirms the concept that the formation of adhesions depends principally on the constitutional terrain of the individual. The introduction of cod liver oil at body temperature into the peritoneal cavity seems to have been of little help.

From the clinical point of view, the advantages of drainage seem to be beyond doubt. However, this does not mean that every case of perforation peritonitis should be drained: if it is possible to intervene shortly after the traumatism, or if there is little soiling of the peritoneal cavity, especially in lesions of the stomach or small intestine which can be thoroughly repaired, the abdomen may be closed without drainage. In all other cases, drainage (preferably capillary) in the vicinity of the lesion or at the lowest point is indicated. The drain should be removed as soon as the general and local conditions show decided improvement. RICHARD KEMEL, M.D.

GASTRO-INTESTINAL TRACT

Tesoriere, A.: The Pathogenesis of Hyperazotemia in Gastroduodenal Hemorrhages (Sulla patogenesi dell'iperazotemia nelle emorragie gastroduodenali). *Arch. ital. di chir.*, 1940, 59: 207.

Tesoriere recalls that Sucíc accidentally found a marked hyperazotemia in a patient with bleeding duodenal ulcer and subsequently made the same observation in 7 other patients. This phenomenon was confirmed by various clinicians who advanced different explanatory theories which are poorly supported by experimental results. To investigate the causes which determine the hyperazotemia of gastroduodenal ulcer, the author has instituted a series of experiments on dogs from which he concludes:

1. External hemorrhage does not produce any demonstrable change in the azotemia because, in the restitution of the blood mass, the fluids subtracted from the tissues carry with them a certain amount of nitrogen.

2. The administration of blood causes an increase in the azotemia not exceeding that of a casein meal, and the azotemia curve reaches a higher level if the blood is given to the same animal from which it has been taken.

3. The increase in azotemia is proportionate to the amount of blood that has been subtracted and then administered.

4. The administration of casein and urea is capable of producing hyperazotemia in a dog that has been bled.

5. The ingested blood is nearly completely absorbed in animals that have been kept on a non-protein diet for several days.

6. The elimination of nitrogen in the urine is earlier and more rapid in dogs that have not been bled than in those which have been submitted to bleeding.

The data obtained seem to demonstrate that in animals in which the mass of blood has been reduced by bleeding the rapid absorption of the nitrogen present in the administered blood leads to a primary rise in the azotemic curve, which is then kept high either by the subsequent supply of products of the digestion of proteins of the ingested blood, or because the fluids subtracted from the tissues for the restitution of the blood mass carry some nitrogen with them. The fact that the administered nitrogen is eliminated in the course of a few days by the dogs that have been bled, while it is eliminated rapidly by the dogs that have not been bled, would seem to explain why in the first case the azotemic curve is kept high for a longer period. Comparison of the hyperazotemia obtained experimentally by the author with some much higher values found in patients having gastroduodenal hemorrhage suggests that in these cases other causes are superimposed on those mentioned by him, for instance, a renal lesion, which, in fact, is found rather frequently.

RICHARD KEMEL, M.D.

Sosnyakov, N. G.: Diagnostic Difficulties in Perforated Peptic Ulcers. *Vestnik khir.*, 1940, 60: 533.

In spite of a clear-cut picture of a perforation of a gastric or duodenal ulcer, not infrequently difficulties arise in the differential diagnosis. The condition may be mistaken for an acute appendicitis, cholecystitis, or intestinal obstruction, and, conversely, a perforated ulcer may be expected when in reality acute appendicitis, pneumonia, diaphragmatic pleurisy, angina pectoris, or perforation of some other abdominal viscus is present.

X-ray examinations, analysis of the blood, and rectal examination are helpful in the diagnosis.

In 7 of 180 cases of perforated gastric or duodenal ulcers, a wrong diagnosis was made.

JOSEPH K. NARAT, M.D.

Jacobellis, P.: Gastric Function in Ulcer of the Duodenum (Funzionalità gastrica negli ulcerosi duodenali). *Ann. ital. di chir.*, 1940, 19: 711.

The reports on acidity of the stomach contents in ulcer of the duodenum have varied greatly, some authors reporting hypacidity or anacidity, others normal acidity, and still others hyperacidity. This may be due partly to the different methods used for determining the acidity and partly to the fact that the determinations were made with different degrees of fullness or emptiness of the stomach.

The author made a series of determinations of gastric acidity in cases of duodenal ulcer diagnosed clinically and roentgenologically, some of them being confirmed by surgery. Tables are given showing the results compared with those in normal individuals used as controls. He first determined acidity in the early morning before the patients had had anything to eat. He then gave parenteral injections of histamine and made further determinations fifteen, thirty, sixty, and one hundred and twenty minutes after the injections. He also examined the stomach contents physically and microscopically.

He found that, compared with normal individuals, both hydrochloric acid and total acidity were increased in the patients with duodenal ulcer. The hyperacidity was more marked after the histamine test than before. Physical examination showed an increase in the amount of gastric juice in all cases and the presence of very finely divided food residues. Microscopic examination revealed blood, duodenal cells undergoing degeneration, and Jaworski's bodies.

AUDREY G. MORGAN, M.D.

Basile, A.: Fibroma of the Stomach (Il fibroma dello stomaco). *Ann. ital. di chir.*, 1941, 20: 79.

The author reviews and summarizes the 64 reported cases of benign tumors of the stomach. Of the 30 patients of whom the sex was indicated 19 were male. The decades most frequently affected were the fifth and sixth, although it was evident that the lesions may have existed long before discovery. The etiology is unknown, a congenital origin having been suspected in several instances, in others an associated gastric ulcer, cholecystitis or cholelithiasis, trauma, or chronic inflammation. The lesion is found to exist in two forms: the submucous which springs for the most part from the connective tissue underlying the mucous membrane and impinges upon the lumen of the stomach, and the subserous form which takes its origin from similar tissue below the serous layer and develops at the expense of the surrounding structures. Of the group of such tumors known to the author, 17 were of the first type and 5 of the second. No characteristic site of development has been noted, although Basile found them to occur with greater frequency near the pylorus than near the cardia. The tumors may be sessile, but show a well defined tendency to become pedunculated. The volume may vary from that of a pea to that of a man's head; the surface is ordinarily smooth and glistening, and of a white color which somewhat resembles cartilage. If the lesion is of the submucous type the surface not infrequently presents ulcerations which may be single or multiple and of varying depth. The consistency is apt to be hard and fibrous, although degenerative processes may intervene to render it harder by calcareous infiltration, or softer and spongy by edema, hemorrhage, or cyst formation. If subserous, the lesion may be complicated by adhesions; if submucous, it may give rise to a diverticulum by traction or to intussusception of the gastric wall into the duodenum.

Because of these variations in character, site, and associated pathology, the symptomatic picture is varied and non-specific. Often signs and symptoms are entirely lacking, and the tumor is discovered by chance at laparotomy. If the lesion is subserous, symptoms may be absent while the signs are those of an abdominal tumor. The more frequent sub-

mucous form, however, is usually accompanied by abundant subjective manifestations which may be suggestive of an ulcer—pyrosis, acid eructations, sense of epigastric weight, vomiting, diarrhea, nausea, and in some cases a selective anorexia to meat. Pain may be slight or knifelike, with radiation to the back. It may occur soon or late after eating, or it may show no relationship to food intake. The symptoms may be markedly aggravated by the occurrence of complications, chief among which is hemorrhage of varying intensity, associated with hematemesis or melena and a more or less profound anemia. The syndrome of mechanical obstruction may resemble either pyloric stenosis or intermittent occlusion of the pyloric orifice. Invagination of the gastric wall into the duodenum is a rare complication and shows itself as an acute occlusion. The general condition of the patient may indicate poor nutrition. Objective findings may include a relative diminution of gastric acidity, or the presence of lactic acid or of blood. Roentgenological examination may reveal a filling defect with smooth margins, not accompanied by infiltration as evidenced by the uninterrupted passage of the peristaltic waves over the involved area.

The differential diagnosis of gastric fibroma is principally concerned with peptic ulcer, gastritis, and carcinoma. The prognosis is governed by the gravity of the complications which may arise. The treatment is surgical and consists of excision of the tumor with the involved portion of the stomach wall.

A case report is added in which a fibroma was associated with an ulcer and was discovered at operation, clinical and roentgenological examinations having failed to reveal it.

EDITH FARNSWORTH, M.D.

Milletti, M.: Post-Traumatic Subcutaneous Intestinal Prolapse (Il prolasso intestinale sottocutaneo post-traumatico). *Arch. ital. di chir.*, 1940, 58: 503.

In 1906 Waldeyer first used the term, "subcutaneous prolapse" to describe eventration after laparotomy. The author found 48 such cases reported in the literature and adds 1 of his own observed at the surgical clinic of the University of Bologna. His patient was a sixty-two-year-old man who had received a blow in the middle of the right rectus muscle. A bruised swelling which became larger on coughing presented itself. At operation under local anesthesia the rectus fibers were found to be torn, as well as the peritoneum through which protruded the hepatic flexure of the colon. This was replaced within the abdomen and the wound closed anatomically.

The author briefly summarizes the 48 cases he found in the literature. He found that 25 of them were associated with visceral lesions. In 20 per cent there was internal hemorrhage, which was fatal in 3 cases (6.12 per cent). In 2 cases (4.08 per cent) there was incarceration of the prolapsed loop of intestine. The total mortality was 26.53 per cent.

The usual traumatic cause is a blow by some blunt object over a circumscribed area of the abdomen. The most serious complications resulting from this condition are incarceration of the prolapsed tissue, perforation of a hollow viscus, and internal hemorrhage. It is necessary, therefore, to operate early and explore very thoroughly. The artery most often involved in cases with hemorrhage is the epigastric. The differentiation between prolapse and hernia is difficult without surgical intervention. The treatment is essentially surgical. JACOB E. KLEIN, M.D.

Tempesta, F.: Chloremia and the Length of Survival after the Experimental Occlusion of the Intestine (Cloremia e sopravvivenza alle occlusioni intestinali sperimentali). *Arch. ital. di chir.*, 1940, 19: 377.

The mechanism of death in intestinal occlusion is not as yet completely understood. A great deal of importance has been attributed to hypochloremia, as it precedes all the other humoral changes.

With a view to studying this question the author performed 5 series of experiments on rabbits, the protocols of which are given. In the first group occlusion was brought about and no treatment given before or after. In the second group 2 c.cm. of a 20 per cent solution of sodium chloride was given before operation, and in the third group a 10 per cent solution of hydrochloric acid. In the fourth and fifth groups the same solutions of sodium chloride and hydrochloric acid were given after operation.

From a study of the results the author could not find any constant relationship between the amount of chloremia and the length of survival of the animals. Some of the animals given hypertonic salt solution died in a condition of slight hyperchloremia. In all cases animals with low occlusion survived longer than those with high occlusion. All of the treated animals survived longer than the controls. The liquid accumulated in the stomach and the loops of intestine above the occlusion contained considerable amounts of sodium chloride.

Death in intestinal occlusion is probably brought about by toxins of intestinal origin. As sodium chloride is mobilized and accumulates at the site of the occlusion it probably has a detoxicating action. Moreover, the water and sodium chloride aid in the elimination of the toxins. The hypochloremia is probably a manifestation of the struggle of the body against the intoxication. AUDREY G. MORGAN, M.D.

Cave, H. W., and Thompson, J. E.: Mortality Factors in the Surgical Treatment of Ulcerative Colitis. *Ann. Surg.*, 1941, 114: 46.

Before mortality rates in ulcerative colitis will be lowered, the cyclic nature of the disease must be fully understood. There are usually four stages: (1) acute activity, (2) convalescence, (3) quiescence, and (4) early recurrence. The principal indirect mortality factor is that surgery comes too late. The two most important direct mortality factors are hemorrhage and peritonitis.

Ileostomy, performed early after massive hemorrhage, has proved, for the most part, unsuccessful. For this reason the authors have decided that profuse hemorrhage is no longer an indication for surgery. They recommend the administration of Vitamin K, if the prothrombin is low, and of Vitamin C and transfusions. The spasm which predisposes to hemorrhage is relaxed with belladonna and papaverine.

In 90 surgical procedures performed in 50 patients with ulcerative colitis, there was a gross mortality of 22 per cent. Ileostomy, though not a difficult or formidable procedure, is attended with a considerable mortality; 8 of the 11 deaths in the reported series followed ileostomy. Of 34 ileostomies performed, 22 were elective and 12 were emergencies. There was a 50 per cent mortality in the emergency group. Half of the patients in this group had perforations before operation and died from the effects of pre-existent peritonitis.

Nine of the 11 fatalities in the authors' series were due to peritonitis. Four were due to technical errors: embarrassment of the circulation in a loop of ileum brought outside of the abdominal wall; dropping back what was thought to be a healthy divided stump of the distal segment of the colon; and soiling while multiple intra-abdominal fistulas were divided at the time of colectomy. In order to obviate peritonitis, it is recommended that the distal divided end of small or large bowel be brought to the abdominal wall to remain as a mucous fistula. The intraperitoneal implantation of crystalline sulfanilamide at operation is also recommended.

The mortality can also be diminished by the proper choice of patients and adequate pre-operative measures. Thus, surgery is justified in chronically ill patients (1) when there is a progressive and continuous extension of the pathological changes, and (2) when they continue to have characteristic periods of recurrence and remission accompanied by extensive involvement of the colon. Impending perforation is unquestionably an indication for surgery.

The correction of abnormal conditions before surgery is undertaken is imperative in chronically ill patients. The test-diet method should be employed when indicated to rule out an active food allergy. Gastric anacidity should be treated to reduce diarrhea and flatulence. Functional diets too low in proteins and vitamins should be corrected. Anemia should be combated. Disturbances in the mineral metabolism must be adjusted, and general malnutrition and inanition should be prevented.

Spinal anesthesia is recommended. When the disease has involved the entire colon, a three-stage operation has proved safest: ileostomy, subtotal colectomy, and proctectomy. When the cecum, ascending colon, and transverse colon are involved, an ileosigmoidostomy (end-to-side) is recommended, with the distal divided end of the ileum brought out as a mucous fistula. When only the rectum and descending colon are involved, transverse colostomy with the removal of the descending colon is performed at the first stage, and removal of the rectum at the second stage.

Low residue feedings are begun the afternoon of the operative day. This has proved helpful in causing the ileostomy to function earlier, by reducing postoperative gaseous distention, and by maintaining adequate nutrition.

In discussing this report, H. B. STONE stated that in his experience sulfanilyl guanidine has no value as a curative agent in the treatment of the basic disease.

HAROLD LAUFMAN, M.D.

Schulte, A.: Non-Specific Inflammatory Tumors of the Large Intestine and Their Differential Diagnosis from Carcinoma (Ueber unspezifische entzuendliche Dickdarmgeschwuelste und ihre Differentialdiagnose gegenueber dem Carcinom.). *Arch. f. klin. Chir.*, 1940, 199: 465.

The author presents the analysis of A. Tuetze of cases of intestinal tumors seen from 1889 to 1918, in addition to 4 case histories from the Hohlbaum Clinic, 3 of which were on inflammatory tumor, and 1 on abscess due to cancer which had been mistaken for an inflammatory tumor.

1. A thirty-nine-year-old man in May, 1933, twice suffered attacks of pain in the left hypogastric region. Then after three years of good health he suddenly suffered again with intense pain and intestinal obstruction. At operation a mesenteric abscess 5 cm. wide was exposed, with a wide, hard, inflammatory mass in the sigmoid. This was resected and an end-to-side anastomosis made. The parietal peritoneum on both sides of the anastomosis was fixed deep to the mesentery so that the anastomosis was extraperitonealized. A cecal fistula formed the next day, but after this there was a smooth recovery. Preparations showed a thickened gut wall, in one portion of which the mesenteric abscess had originated. The mucous membrane throughout was intact.

2. A thirty-seven-year-old man had suffered hard, cramp-like pains under the left rib margins in February, 1937. These subsided spontaneously but recurred after two months. This time there was a painful, reddened swelling in the left lumbar region. He was operated on with a diagnosis of perinephritic abscess. Odorless, blood-stained pus was drained. Three days afterward, a fecal fistula developed. The x-ray study with a contrast enema led to a diagnosis of stenosing tumor of the middle of the descending colon. There were no characteristic findings for malignant tumor, as the mucous membrane of the narrowed portion showed little change. In a second operation, a side-to-side anastomosis between the transverse and sigmoid colon was made. Healing occurred. An x-ray study eight months later showed a smooth contour between the transverse and descending colon and the lumen was normal.

3. A fifty-seven-year-old man had suffered paroxysmal attacks of pain in the left hypogastrium for ten years. Within three to four months, these had subsided completely. In 1934, the pain recurred.

The patient suffered distress and the stool always contained macroscopic blood. The x-ray diagnosis was an inflammatory stenosing tumor of the sigmoid colon. At operation, hard, firm adhesions between the small and large intestines were found. Two abscesses containing the bacillus coli were encountered. The stenosed portion of the sigmoid was resected and an end-to-side anastomosis was made, extraperitoneally. Healing was uneventful. Five years later the patient was entirely symptom-free. Preparations showed a narrowed portion of intestine 7 cm. long, the walls of which were thickened in places, while the mucous membrane was intact.

4. The patient, a forty-four-year-old man, first noticed in January, 1937, that he had lost 15 lb. in a short time, and from time to time had a sense of pressure in the hypogastrium. Occult blood occurred in the stool. In November, 1937, the symptoms grew worse. He had a fever of 39 degrees. The diagnosis was peritonitis, secondary to an inflammatory tumor of the large bowel. Operation showed numerous inflammatory adhesions between the large and small intestines. A deep abscess containing the bacillus coli was encountered at the level of the promontorium; it was opened and drained. In the postoperative course, a fecal fistula formed. X-ray examination showed a narrowing to the thickness of a lead pencil above the rectal ampulla which was about 5 cm. long. At this place, the mucous membrane was ragged, fringed, and roughened. The diagnosis was cancer. The patient was operated upon again with resection of the tumor, and the end-to-side anastomosis was extra-peritonealized by approximation of the parietal peritoneum and mesentery. For a while there was smooth progress, then right-sided empyema. A rib resection was then done and the bacillus coli was found in the pus. The patient died three weeks later. The microscopic diagnosis was adenocarcinoma.

The author has searched the literature from 1925 on and collected 100 further interesting cases. They show the difficulty of differential diagnosis. Abdominal and peritoneal abscesses seldom occur with carcinoma. The inflammatory tumors occur most frequently between the ages of forty and sixty years. Men are twice as frequently affected. One instance was found in a child of five years. In most cases, the patient with an inflammatory tumor has more chronic pain, with intervals entirely free from trouble. Difficulty in passing urine is not infrequent. Eisenberg attributes 8 cases in a series of 58 patients to rupture of a diverticulitis of the bladder. Objectively, an increased sedimentation rate is indicative. Also, not infrequently macroscopic as well as occult blood is found in the stool. In 100 cases, occult blood was found 4 times and macroscopic blood 9 times. The x-ray study is important. It shows that the mucous membrane is intact. The variability of the x-ray findings speaks further in favor of inflammatory tumor. Also, one finds peritoneal irritation earlier with inflammatory tumors. Both palliative and radical operative methods have had good results, and both one-stage and two-stage operations are done. Often an artificial anus is of value. Errors of diagnosis will always be possible, for cancer in some circumstances has an inflammatory character. Both kinds of tumors appear to have a predilection for the ascending colon.

(Franz). Marian Barnes, M.D.

Buirge, R. E.: Carcinoma of the Large Intestine; Review of 416 Autopsy Records. *Arch. Surg.*, 1941, 42: 801.

All of the patients reported on in this review came to autopsy in the department of pathology at the University of Minnesota between January, 1910, and July, 1937, because of carcinoma of the large bowel. Four hundred and sixteen records of carcinoma of the large intestine and of the rectal canal were collected from 26,798 autopsy records.

The author arrives at the following conclusions:

The relation of age, sex, and site in this series of malignant lesions of the large intestine apparently presents no evidence of geographic influence when compared to the experience generally encountered in other sections of the country.

The early clinical pattern of malignant disease of the colon presents no specific symptoms. It is not until hemorrhage or interference with function appears that the patient seeks medical advice. Therefore, melena, change in intestinal habit, weakness, anemia, loss of weight, or signs of colonic obstruction, whenever present and in whatever combination, should be thoroughly investigated to rule out the presence of carcinoma of the large intestine before the patient's complaint is treated symptomatically.

Reliable clinical proof of early colonic cancer depends on the roentgen rays. Digital examination of the rectum and the use of the sigmoidoscope are important for recognition of neoplastic lesions of the distal segments of the colon.

Joseph K. Narat, M.D.

Coller, F. A., Kay, E. B., and MacIntyre, R. S.: Regional Lymphatic Metastases of Carcinoma of the Colon. *Ann. Surg.*, 1941, 114: 56.

This study is based upon the dissection and examination of the lymph nodes in 46 specimens of carcinoma of the colon, by David and Gilchrist's modification of the method of Spalteholtz. Microscopic examination of the lymph nodes was done and the results charted on diagrams. An average of 52 nodes were isolated per specimen.

Regional lymph-node metastasis is only one factor in determining the operability and prognosis of carcinoma of the large intestine. Inoperability or a poor prognosis may result from extensive local infiltration, hematogenous metastasis, or peritoneal implantation. Ten per cent of the neoplasms showed microscopic evidence of infiltration into the blood vessels. Local infiltration was evidenced in 93.1 per cent of specimens in which there was complete infiltration through the bowel wall. This is a constant source of free peritoneal implantation.

The lymphatic drainage of the colon is reviewed. Involvement of regional lymph nodes in this series was present in 60.87 per cent of the cases. There was an average of 59.4 nodes isolated per specimen in those showing nodal involvement, and 41.4 nodes isolated in specimens showing no metastases. Sixty-two and one-half per cent of carcinomas of the right colon showed metastases, in comparison with 60 per cent of those of the left colon.

The size of the nodes is not an index of metastatic involvement. Since manual palpation does not reveal accurate information as to regional lymph-node metastasis, the surgeon must recognize the necessity of including the areas within the confines of the operative resection, even in the absence of palpable nodes. If carcinoma has metastasized to the main group of lymph nodes at the origins of the various vessels, then generalized metastases, undoubtedly, have already occurred and any operative procedure would only be palliative in character.

The presence of metastases in lymph nodes from carcinoma of the colon is more frequent than indicated by previous studies. This emphasizes the importance of planning operation for removal of carcinoma of the colon on an anatomical basis, to include regional lymph nodes regardless of their palpability. HAROLD LAUFMAN, M.D.

Stone, H. B., and McLanahan, S.: Results with the Fascia Plastic Operation for Anal Incontinence. *Ann. Surg.*, 1941, 114: 73.

The authors report further success with a method of restoring control of the anal outlet. The method involves the use of fascial strips, either autogenous or of prepared sterile ox fascia. The strips are inserted through two small incisions, one on each side of the anal opening. Each strip is made to encircle the anus in a subcutaneous bed, and is sutured to the medial edge of the gluteus maximus muscle on each side.

The operation has been performed on 30 patients, ranging in age from twelve to seventy-two years. There was no mortality. The most frequent indication for the operation is the incontinence following excision of fistulas.

Eighty-seven per cent of the patients demonstrated some improvement, and in 40 per cent the results approximated normal control. There were 4 (13.3 per cent) failures.

In order to achieve success with this operation the gluteal muscles must be properly innervated and able to contract voluntarily. The patient must possess the intelligence to use the muscles to contract the anal canal, and the patience to practice this contraction frequently. As in all plastic operations, infection may spoil the result. In 6 cases fragments of fascia were discharged from the wounds, but in only 2 of these 6 was the result unsatisfactory. Failure does not make the original condition any worse, and does not prevent a repetition of attempts by the same or other methods.

HAROLD LAUFMAN, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Josephson, B., and Larsson, H.: Elimination of Cholic Acids. Quantity and Course of the Normal Secretion and Circulation in Man. *Acta med. Scand.*, 1941, 107: 584.

The bile from 7 cholecystectomized but, in other respects, healthy human subjects was collected and examined hour by hour for twenty-four hours or more, the pigments and the cholates being determined.

Two series of experiments were performed. In one type of experiment all of the bile was constantly withdrawn. In the other the normal circulation was maintained by the refeeding of all the collected bile to the subject.

In the first series, the cholate production of the liver varied between 0.7 and 2 gm. per day. In the second series the sum of produced and circulating cholates excreted by the liver varied between 1.5 and 7 gm. per day.

No regularity or rhythmic variations, either in the production or in the circulation of bile pigments, could be found.

Nor could the authors find any rhythm in the cholic-acid production. On the other hand, when the circulation was maintained, the cholate output tended to decrease some time between midnight and early morning. This would indicate the presence of a diurnal rhythm in the cholate circulation and not in the production of new acid.

SAMUEL H. KLEIN, M.D.

Gutman, A. B., and Hanger, F. M., Jr.: The Differential Diagnosis of Jaundice by a Combined Serum Phosphatase Determination and Cephalin Flocculation Test. *Med. Clin. North Am.*, 1941, 25: 837.

Various laboratory methods commonly used to determine the presence and degree of severity of liver and biliary-tract disease are classified according to the physiological mechanism involved. Attention is called to the fact that procedures employed for the detection of liver injury are distinct from, although complementary to, tests for obstructive jaundice.

Among the former group are found the hippuric-acid excretion and the galactose-tolerance tests, examinations for serum cholesterol esters, and the cephalin flocculation reaction previously described by one of the authors. Among the latter is the examination for free or total serum cholesterol as well as the determination of the serum phosphatase level.

Errors occur in the interpretation of both groups of tests. The tests comprising each group have certain limitations in common and they are not overcome by a repetition of procedures belonging to the same group.

The authors have used the cephalin flocculation reaction as a measure of liver parenchymal damage,

and the serum phosphatase determination as an index of biliary-tract obstruction, and have found that the accuracy of the differential diagnosis in jaundice was increased by the combination of these complementary methods.

They conclude that the diagnosis of obstruction of the common duct is highly improbable if the serum phosphatase level is below 10 Bodansky units and if the cephalin flocculation test is strongly positive. The clinical decision to explore jaundiced patients is supported by the finding of a serum phosphatase level over 10 Bodansky units and a negative cephalin flocculation reaction. However, the results of these tests are not always clear-cut, for in a significant proportion of cases the diagnostic implications were conflicting and difficult to interpret.

WALTER H. NADLER, M.D.

Aggeler, P. M., and Lucia, S. P.: The Bleeding Tendency in Diseases of the Liver and Biliary Passages. *Acta med. Scand.*, 1941, 107: 179.

The present status of the problem of abnormal bleeding and the measurement of this tendency in obstructive jaundice and liver disease are discussed. Complete relevant data are presented for 26 patients with obstructive jaundice and 41 with diseases of the liver. They reveal the bleeding time according to the method of Ivy, the coagulation time as measured by a slight modification of the method of Lee and White, the prothrombin concentration according to the method of Quick, the clot-retraction index by means of the method of MacFarlane, and the capillary fragility according to the method of Dalldorf. Particular attention was given to alteration in the results of these tests following the administration of three synthetic Vitamin K compounds.

Fifty-four of the 67 patients studied had evidence of a bleeding tendency and 17 of them had some form of abnormal bleeding. In only 1 patient who bled was a diminished prothrombin concentration the sole abnormality noted in the bleeding and clotting mechanism. In 16 patients with prothrombin concentrations of 70 per cent or more there were disturbances in the hemostatic equilibrium; 6 of these had some form of abnormal bleeding and in the 3 who received Vitamin K there was no effect on the bleeding. In 7 patients whose diminished prothrombin concentrations were not elevated after the use of Vitamin K there was also no effect on the bleeding. In 4 of 7 patients whose diminished prothrombin concentrations were elevated after the administration of Vitamin K, bleeding ceased promptly, but it continued in 3 patients.

WALTER H. NADLER, M.D.

Carli, C.: Primary Tumors of the Liver (Sui tumori primitivi del fegato). *Arch. ital. di chir.*, 1940, 58: 211.

Carli discusses the pathologico-anatomy and the clinical aspects of benign and malignant primary tumors of the liver and describes 2 cases of primary hepatic carcinoma. The symptomatology and the course of the 2 cases presented great similarities: there were mild subjective symptoms with a large mass in the right hypochondrium, absence of icterus in the first and intense icterus in the second case, and a very rapid course with fatal outcome within a few months. Leucocytosis and eosinophilia were present, the latter being especially marked in the second case.

It is often difficult to determine whether a tumor of the liver is primary or secondary, and some authors claim that the decision cannot be made without a complete autopsy. In both of the author's cases, the diagnosis of primary tumor was made clinically on the following bases: (1) the absence of preceding symptoms referable to a tumoral localization elsewhere and particularly in the digestive tract—in both patients the first disturbances occurred exclusively in connection with the hepatic tumor, which was found in an advanced stage of its evolution a short time after the beginning of the symptoms; and (2) the absence of roentgen and clinical signs of other neoplastic localization. The exploratory laparotomy and the very rapid course of the disease supported the clinical diagnosis.

Anatomicopathologically, the 2 cases presented a large, globular, intrahepatic tumor of the right lobe, protruding from its lower aspect, apparently single but really composed of multiple nodules crowded together, with small nodules developing toward the left lobe. The tumor seemed to be larger and harder in the second case. Both tumors were regarded as intermediate forms between the massive and the nodular kinds. The 2 cases differed histologically: the first belonged to the adenocarcinomas and the second to the alveolar carcinomas. Histogenetically, the first was regarded as a cholangiocellular and the second as a hepatocellular type.

Examinations of specimens taken at a distance from the tumor showed that the liver tissue was completely replaced by connective tissue. This raises the question of the relationship between the connective-tissue reaction and the tumor, the question being based on three points: the precedence of the tumor and secondary proliferation of the connective tissue, the precedence of cirrhosis and origination of the tumor from its newly formed connective tissue, and the simultaneous development of the two processes as a reaction to a single stimulus. The history of the first patient did not reveal any of the usual factors accepted as causing cirrhosis, or any disturbances referable to a cirrhotic or precirrhotic condition preceding the symptoms of the hepatic tumor; in addition, histological examination showed the presence of young connective tissue with abundant lymphocyte and plasma-cell infiltration. Therefore, it was thought that the tumor had started in a healthy liver and that the interstitial lesions were caused by it. The contrary was the case in the second patient, who had had a previous cholecystitis, had always been a heavy drinker, and was a corpulent, plethoric individual. All this had undoubtedly pre-

disposed the liver to cirrhosis. Although his symptoms were referable to the tumor from the beginning, his intense and progressive icterus without disturbances of the intrahepatic biliary system, his marked urobilinuria, and his signs of decided liver insufficiency, occurring shortly after the intervention and progressing gradually toward terminal coma, denoted a diffuse anatomicofunctional change in the liver, such as that found in cirrhosis. In addition, histological examination showed that the liver parenchyma at a distance from the tumor was changed into fibrous connective tissue containing remnants of hepatic trabecules and occasional biliary canalicules constricted and deformed by the connective tissue. Around the tumor, the connective tissue had a hyaline, loose aspect, as if it had undergone the regressive influence of the tumor. Therefore, it is thought that the chronic interstitial lesions had preceded the appearance of the tumor.

RICHARD KEMEL, M.D.

Doran, W. T., Lewis, K. M., Hanssen, E. C., Spier, L. C. B., and Doran, W. T., Jr.: Gall-Bladder Surgery. A Ten Years' Statistical Review Including 410 Operated Cases. *Am. J. Surg.*, 1941, 53: 41.

The authors present a ten-year survey of 410 operations for gall-bladder disease done at the Bellevue Hospital in New York. Cholecystography, biliary drainage, and blood chemistry were done in the diagnostic work-up.

An analysis of the cholecystograms revealed that when no visualization of the gall bladder, delayed emptying, or shadows of calculi were reported, the findings were confirmed at operation in 84 per cent of the cases, while if cases showed normal visualization and normal emptying time of the gall bladder without shadows of calculi, the x-ray findings were confirmed in only 50 per cent of the cases examined. Thus, the greatest margin of error lay in those cases which appeared normal in the roentgenograms.

Biliary drainage was done with the aid of the Twiss tube and the horizontal tilt-table fluoroscope, and is regarded as a necessary and important diagnostic procedure. The presence or absence of concentrated bile in the pre-operative drainage bears no direct relationship to the presence or absence of calculi found at the time of operation, the presence of concentrated bile denoting only patency of the cystic duct and the ability of the gall bladder to concentrate bile.

In 24 per cent of 209 cases which were operated on and in which biliary drainage was done, cholesterol crystals were present; calcium bilirubinate was present in 16 per cent, and both were present in 17 per cent. When cholesterol crystals were present, stones were found at operation in 92 per cent, and the presence of calcium bilirubinate in bile was associated with stones in 80 per cent. These findings indicate that when cholesterol crystals or bilirubin calcium pigment is found in bile obtained by duodenal drainage prior to operation, there is a strong probability that stones are present. However, their absence is not a reliable indicator of the absence of stones.

Non-surgical biliary drainage was also utilized postoperatively as a means of determining the function of the sphincter of Oddi and as an aid in its management. Dietary regulation, general hygienic measures, and the judicious use of sedatives and antispasmodics were also valuable adjuncts in reducing the postoperative morbidity.

Further diagnostic measures included the icterus index; blood cholesterol, blood sugar, and nonprotein nitrogen determinations, the bleeding time and clotting time, the Van den Bergh test, determination of bile in the urine, the blood Wassermann test, urinalysis, and complete blood count. At operation cultures were made of the gall-bladder wall and the gall-bladder bile whenever possible. Cultures of the gall-bladder wall were positive in 55 per cent, and of the gall-bladder bile in 51 per cent of the cases, the most frequent organisms being the bacillus coli, staphylococcus aureus, and streptococcus viridans.

T-tubes were inserted whenever the common duct was opened, and cholangiograms were taken whenever indicated to determine the presence of any calculi overlooked in the common duct. Jaundiced patients with prolonged clotting time received Vitamin K and bile salts supplemented by blood transfusions. Catgut was routinely used for sutures and ligatures, although silk and cotton thread were employed on occasion.

There were 127 cases of chronic cholecystitis with stones, all of which were treated by cholecystectomy. There were 26 cases of chronic cholecystitis without stones; cholecystectomy was performed in every case, and with choledochostomy in 1. Thirty-three patients had acute cholecystitis with stones; cholecystectomy was performed in 26 of them, and cholecystostomy in 7. Ten patients had acute cholecystitis without stones; cholecystectomy was done in 4 of these, and cholecystostomy in 6. There were 14 patients with stones in the common duct; cholecystectomy was done in 8, cholecystostomy in 2, and choledochostomy in all 14.

Complications occurred in 93 of the series of 410 operative cases. The most frequent complication was wound infection, which occurred in 34 or 8 per cent. Pneumonia occurred in 11 cases, cardiac decompensation in 8 cases, and postoperative shock in 5 cases.

Of the 410 patients operated upon, 26 died, a mortality rate of 6.3 per cent. Among the causes of death were postoperative pneumonia, "liver shock," pulmonary embolus, cardiac decompensation, massive collapse of the lung, and peritonitis.

Among 222 cases followed up there was a symptomatic cure in 84 per cent of the cases of acute cholecystitis, 70 per cent of the cases of chronic cholecystitis with stones, and 41 per cent of the cases of chronic cholecystitis without stones. Among the cases of common-duct stone, the follow-up study

showed no recurrence of pain or jaundice in 60 per cent. S. LLOYD TEITELMAN, M.D.

River, L., McNealy, R. W., and Ragins, A. B.: Carcinoma of the Ampulla of Vater; 3 Cases of Transduodenal Resection. *Am. J. Surg.*, 1941, 52: 289.

Complete work-up should be started on the jaundiced patient as soon as the history is written, and the administration of Vitamin K, bile salts, increased glucose, and blood, (as available), should begin at the same time. Roentgenography, at present, offers little diagnostic help.

If obstructive jaundice is demonstrated, particularly in the absence of pancreatic ferments in the duodenal contents and the presence of blood in the stools, surgical exploration should wait only upon adequate preparation of the patient.

In addition to the usual exploration of the gall bladder and ducts, and palpation of the duodenum and pancreas, the duodenum should be mobilized and palpated, or opened, or both.

For the small, early tumors one-stage local resection seems still to be the procedure of choice. The pancreatic duct may be ligated if necessary. If the size of the growth and the extent of invasion of the duodenum and pancreas indicate the futility of attempting one-stage local resection, the first stage of Whipple's operation should be done. Excellent palliation with little danger of ascending cholangitis may be expected from the cholecystojejunostomy. Longitudinal anterior duodenotomy with transverse closure is suggested as compensation for the posterior resection.

Three instances of successful transduodenal resection of periampullary carcinoma with re-implantation of the ducts are recorded. Two required subsequent internal biliary drainage because of stenosis at the anastomoses. JOSEPH K. NARAT, M.D.

Popper, H. L., and Plotke, F.: Studies on Pancreatitis. *Surgery*, 1941, 9: 706.

The authors commend the value of blood amylase determinations in acute pancreatic diseases, as well as the value of the determination of the blood lipase. However, the presence of increase in the concentration of the amylase being of such short duration, from three to five days, definitely reduces the value of the procedure. In some of the clinical cases it was even noted that the blood amylase level diminished even before the third day of the disease. It is, as they say, an open question why this elevation persists only for a few days. In search for an answer to this question, the authors attempted a series of experiments in which intravenous injections of commercial trypsin were employed. The blood of dogs suffering from acute pancreatitis was infused into normal dogs, and acetyl-betamethyl-choline and eserine were injected. Repeated serum-amylase and serum-lipase determinations were carried out.

The experiments revealed that the body begins to eliminate an increased amount of blood amylase very promptly, and this elimination is maintained only if there is a continued introduction of the ferment into the circulation. That a similar condition exists in human pancreatic disease is to be assumed. One can, therefore, conclude if the serum amylase in human pancreatitis decreases within the first three days of the disease, the pancreatic disease is resolving and less of the amylase is being discharged into the blood stream. On the other hand, if the blood level of the amylase does not descend until after the third to fifth day one must assume that the pancreas is so damaged that it is incapable of discharging more of the enzyme into the circulation.
WILLIAM C. BECK, M.D.

Walters, W., and Cleveland, W. H.: Surgical Lesions of the Pancreas; A Review. *Arch. Surg.*, 1941, 42: 819.

Surgical lesions of the pancreas are not rare. Two hundred and fifty-five operations upon the pancreas were performed at the Mayo Clinic in the five-year period ending 1939, or approximately 1 operation for every 25 performed on the gall bladder and bile ducts.

The most frequent surgical lesion of the pancreas is carcinoma. One hundred and eighty-five, or 73 per cent, of these operations in the five-year period were performed for carcinoma. When jaundice is present, some sort of operation that will short-circuit the bile, such as cholecystogastrostomy, is the best procedure. About 15 per cent of the lesions which appear to be malignant are, in reality, benign and inflammatory lesions.

Acute pancreatitis is rarely encountered, and when the diagnosis is definite, operative treatment is probably best deferred. Chronic pancreatitis is more common and usually is associated with disease of the biliary tract; it can be managed by correction or treatment of the biliary disease.

Pancreatic cyst, although not common, was treated surgically in 139 cases during 1939. Excision, partial excision, and drainage with or without marsupialization have given good results.

Pancreatic stones, when they are not merely calcifications of the parenchyma but real intraductal stones, should be removed to prevent pancreatic atrophy, diabetes, and fatty infiltration of the liver.

At the clinic the authors have observed 16 cases of hyperfunctioning tumor of the islands of Langerhans in which hypoglycemia was present. In 12 of the cases removal of the tumor was possible. Four of the tumors were inoperable carcinomas, and 4 of the 12 removed tumors were carcinomas. Eighteen patients with severe degrees of hypoglycemia have been subjected to exploratory laparotomy at the clinic, but no tumor was found. Tumors of the pancreas which produce hypoglycemia should be excised early on account of the danger of malignancy.

Ten cases of accessory pancreas have been observed since 1935. In 6 the accessory pancreas was removed because it was producing symptoms. In 4 the accessory pancreas was removed by excision and

some other operative procedure. The accessory pancreas should be removed if it is the cause of symptoms.

Recent advances have been made in the diagnosis of pancreatic disease by virtue of the development of tests for serum amylase and lipase, and the secretin test for stimulation of pancreatic secretion.

MISCELLANEOUS

Petri, S., Nørgaard, F., and Jensenius, H.: Experimental Studies on the Production of Pernicious Anemia by Operation on the Digestive Tract. Results of 3 Types of Combined Elective Resections of the Stomach and Duodenum on Dogs. *Acta med. Scand.*, 1941, 107: 506.

An account is given of the writers' experimental studies, previous and new, on the results of three different types of elective combined resections of the stomach and duodenum performed on pups and adult dogs.

Operative elimination of the area estimated by clinicotherapeutic investigators to be the localization of the intrinsic factor (pylorus and the Brunner-gland area in the duodenum) has not resulted in experimental pernicious anemia. Thus, there is a conspicuous divergence between the view of the clinicians concerning the specific anti-pernicious-anemic function of a pyloric-gland organ and the results of parallel animal experiments concerning the same region.

The aforementioned operations, on the other hand, have constantly brought about the development of a pellagrous syndrome. In pups this appeared in (1) a "gastroprival" form, which was severe, fatal, acute or chronic, and characterized by arrest of growth, emaciation, skin and hair changes, degeneration of the central nervous system, and changes in the blood and bone marrow, and (2) two "pyloroprival" forms: (a) an acute, clinically atypical, fatal form, characterized by severe anemia and severe morphological changes in the central nervous system; but more often (b) a chronic, milder form with changes which corresponded essentially to those of (1) but showed additional particular phenomena: alopecia areata-like loss of hair, pigmentation of the skin, achylia, and a tendency toward remission.

In adult dogs there appeared only a chronic, relatively mild, subpellagrous condition—regardless of the type of operation to which the animal was submitted. A thorough account is given of the clinical and morphological features of all of these morbid changes.

SAMUEL H. KLEIN, M.D.

GYNECOLOGY

UTERUS

Genell, S.: A Synopsis of a Physiological Investigation Regarding the Motor Function of the Uterus in the Non-Gravid Organism (Uebersicht ueber die physiologische Forschung betreffend die motorische Funktion des Uterus im nichtgraviden Organismus). *Ergebn. d. Physiol.*, 1940, 43: 371.

In this article Genell summarizes our present day knowledge of the physiology of the uterus. He has made a detailed study of the literature and performed successful experimental laboratory work on this subject and therefore his estimation and summarization of the current reports on the physiology of the uterus are valuable. The study begins with 364 reports found in the literature from 1850 to 1939. This record is divided into 2 parts: the first is a summary of the methods of study employed, and the second is a tabulation of the results of the physiological researches.

Regarding the methods of study, the author mentions the older methods of William Harvey, Spiegelberg, Frommel, and Kurdinowski; as well as the newer methods, such as Magnus Kehrer's experiments *in vitro*, Trendelenburg's technique *in vivo*, with modifications by Clark, Knaus, and Genell; Katsch-Borscher's fenestrated abdominal method, the Ballon method with its modifications, Schultze's hysterosalpingography, and Westman's laparoscopic attempts.

In the second part—the results of the physiological researches—the discussions pertain to the following: muscle physiology, nerve physiology, hormonal regulation, and finally the biological function of the uterine motility.

In the chapter on muscle physiology the mechanical, thermal, and chemical irritation of the uterus are discussed. Of the chemical irritations, the special influence of oxytoxins upon the uterine musculature is described in detail, an influence which is characterized by an increase of frequency, of amplitude, and of tonus, and which is similar in its results to those obtained by Ludwig and Lentz (1924) in their experiments *in vitro* and *in vivo*. In this connection Genell's warning, not to mistake the condition of contraction for that of the tonus, or vice versa, is significant. Sun made an interesting experiment in 1925 and claimed that there were different reactions of pituitrin in different parts of the uterus: the lower segment of the uterus in human beings reacts with a great increase in tonus without any apparent volition. In this chapter the author discusses the significance of the "Ionenmilieus" and the hydrogen-ion-concentration.

The gist of the chapter on nerve-physiology is the description of the action of autonomic "pharmaca" upon the contraction relationships of the uterus. In this chapter Genell also emphasizes the still prevalent uncertainty as to the function of the parasympathetic nerve tract. Hasama's interesting attempts at registering the paths or courses of uterine activity are stated. According to Hasama, the tonus impulses of the uterus are produced by the sympathicus and the rhythmic contractions by the parasympathicus. The studies of Dyroff and Stefanik yielded similar results. Mahon (1939) claimed that the sympathicus is the nerve that controls the tonus of the corpus uteri, and that the parasympathicus is an accessory motor nerve of the uterus which is contracted intermittently.

The last and longest chapter concerns the hormonal regulation of uterine motility. The uterine motility depends upon the sex cycle variations. In animals having normal sex cycles and spontaneous ovulations the contractions are not so frequent during estrus; however, during the diestrum the rhythm is increased and the power diminished. In human beings these conditions are different. Knaus (1930) is of the opinion that during the corpus-luteum phase the spontaneous activity is disturbed or entirely suspended. Kraul (1935) states that the activity during the postmenstrual period is more marked than in the premenstrual period. Moir (1933) found spontaneous activity in the non-pregnant uterus during all of its phases; in the first half of the interval the contractions were small, frequent, and regular, and after the sixteenth day they became stronger but lost their regularity. All of these various theories are sponsored by different observers.

It is Genell's opinion that in the rat, under the influence of the sex hormones, the different types of uterine motility during the course of the sex cycle are caused solely by the estrin, and that the corpora lutea of ovulation do not have any endocrine influence upon this motility. This theory is backed by castration and substitution attempts. The relation of the sex hormones to the tonus of the uterine musculature is interpreted differently by the various investigators. According to researches made on women by Wilson and Kurzrok in 1938, the tonus during the follicle phase is greater than that during the corpus-luteum phase. For these examinations these authors used the Ballon method. Kumagi, using the same method in examining dogs, claims to have established the opposite results. Genell's own investigations of rats *in vivo*, as well as *in vitro*, yielded results that showed that the tonus varied with the sex phases: during the heat phase the tonus was lower than in the non-heat phase. The diminishing tonus in the heat phase was conditioned by the folliculin. Castration attempts also proved that the uterus was kept at a certain tonus by nonhormonal factors. The cervical musculature maintains a different tonus than does the corpus musculature. Genell found, also in the rat, that the cervical canal is narrower during heat than at other times.

In this chapter Genell also mentions the relations between sex hormones and hormones of the posterior lobe of the pituitary gland, metabolism of the uterus and its vascularization, ionenmilieu and autonomic "pharmaca." The chapter closes with a discussion of the mechanical effects of the sex hormones upon the uterine musculature. The estrual action is supposed to affect the muscle cells directly via the autonomic nervous system by changing the ion concentration and also by changing the vascularization of the uterus. Progestin, i.e., the corpus-luteum hormone, is assumed to affect the muscle cells either directly or via the hypophysis.

The last chapter describes the biological function of uterine motility—transport of the sperm. The ejaculation theory of Gunn and Franklin (1922) is described, and Genell, backed by the results of his own experiences, supports this theory. This type of mechanical transport of the sperms in the uterus is aided by the pro-peristaltic and anti-peristaltic waves. (KARLSON). MATHIAS J. SEIFERT, M.D.

Ratzenhofer, M.: Angioma of the Uterus as an Unusual Cause of Metrorrhagia (Angiomatosis uteri, ungewoehnliche Ursache einer Metrorrhagie). *Wien. klin. Wchnschr.*, 1940, 2: 874.

The author reported the case of a forty-seven-year-old woman who suffered frequently from irregular hemorrhages. Two curettages and medical treatment were unsuccessful. Irradiation of the spleen had only a temporary effect. A recent hemorrhage was treated by another curettage and when this was unsuccessful vaginal hysterectomy was done.

Histological studies of the uterine scrapings were negative as to any changes, but microscopic examination of the enlarged uterus demonstrated the presence of numerous thin-walled vessels in the internal layers of the otherwise normal myometrium. The capillary system as well as the afferent and efferent vessels was normal. The term "angiomatosis uteri" was used to describe the changes.

A search of the literature revealed no similar case, but there was a certain similarity to the angiomas described by Falk and Walthard. Apparently there was a congenital basis for these changes as the occurrence of frequent nosebleeds, telangiectasis under the right eye, and marble-skin (cutis marmorata) indicated a generalized involvement of the vascular apparatus in this woman. Hereditary factors, as in Osler's disease are probable. At any rate, the condition was a rare disturbance of the vessels of the uterus, which was the morphological basis for the repeated metrorrhagia.

(HANS HEIDLER). JACOB E. KLEIN, M.D.

Newcomer, E.: Comments on the Treatment and Sequelæ of Carcinoma of the Uterus. *Am. J. Roentgenol.*, 1941, 45: 651.

This article reviews numerous opinions regarding the proper radiation of cervical and fundal cancer. The points which the author wishes to emphasize are summarized as follows:

Roentgen therapy should precede radium therapy. It reduces the infection, and thus makes the application of radium safer. It also reduces the size of the growth, and renders it possible to give a heavier dose of radium more evenly distributed throughout the tumor.

If the roentgen therapy precedes the radium, it is not necessary to give the radium in divided doses, except in cancer of the body of a very large uterus. Equally good results have been observed after both methods. Radium should be given in both the uterine and cervical canals in dosages just a little short of toleration of the surrounding tissues. As large a dose of radium as can safely be tolerated should be applied to the vault of the vagina by means of the bomb or colpostat, or by interstitial irradiation in selected cases.

The author's method is as follows:

Within four days or a week after roentgen irradiation, radium is applied by means of the intra-uterine applicator. Usually 100 mgm. of radium distributed in 5 mgm. needles are used. These needles are placed in the applicator in 4 sections, with 4 needles on the outside and 1 in the center of each section. The filtration is 1 mm. of platinum and 1 mm. of aluminum. The radium usually remains in place for thirty-six hours—a total dosage of 3,600 mgm. hours. Three or four days later, a vaginal bomb containing 100 mgm. of radium is placed in the vaginal canal against the cervix, for from twenty-four to thirty-six hours. The filtration is 1 mm. of lead, at a distance of 1 cm.

The sequelæ and complications are usually seen only in very advanced cases.

It is believed that the addition of two lateral fields and another field over the lumbar vertebræ would minimize the extension of the cancer to the side walls of the pelvis and to the lumbar area, which areas are especially subject to extension if the case is at all advanced. DANIEL G. MORTON, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Harjola, O. A.: Adnexal Defects (Ueber Adnexdefekte). *Acta obst. et gynec. Scand.*, 1941, 21: 29.

Although a unilateral defect of the adnexa is almost the rule in some lower animals, it is rarely found in man. Rokitansky speaks of torsion and constriction of the adnexa as the causes. Ogorek adds strangulation as a factor. Torsion of the adnexa can occur only when the latter are freely movable and the causative factors include (1) a physical factor (other than the mobility) which affects the adnexa; (2) a physiological or pathological factor, such as long tubes or adnexal tumors; and (3) a propulsive or driving force, such as intestinal peristalsis, emptying and filling of the bladder, pregnancy, active trauma (jumping and rotation movements of the trunk), and passive trauma (falling and bimanual examination). It has been disputed whether the adnexal defects should be considered as primary developmental disturbances (aplasias), or

as conditions developing during the fetal period or during later life. Neither has been definitely proved.

Regarding the cause of the torsion of normal adnexa two theories prevail today: the so-called hemodynamic theory of Payr, and the rotation theory of Sellheim. According to the former, a rise in the pressure within the ovarian and tubal veins causes the latter to wind corkscrew-like around the artery and thus produce torsion of the adnexa. Sellheim claims that this force is insufficient to produce torsion, that a stronger force is necessary, such as the rotation movements of the trunk, especially around the transverse axis.

Pathologically, Kermauner classifies the adnexal defects into 5 groups: (1) the tube, ovary, broad ligament, uterine cornu, as well as the kidney and ureter of the same side are missing; (2) the uterus is of normal form, but there is only a median stump of the tube from 0.5 to 1.5 cm. long; (3) the ovary is missing and the middle portion of the tube is canalized, but thins out laterally into a solid band; (4) the same condition exists as in the previous group, but the tube is of normal length, is coiled up, and gradually becomes thinner and ends in a knob, with an isolated mesosalpinx; (5) the ovary is missing, but everything else is normal.

Only the first group of cases fulfill the demands of a primary aplasia. The other four forms are produced by secondary causes, such as torsions and constrictions. Twisted or constricted adnexa may be completely resorbed, and the peritoneum is then of a peculiarly glistening smoothness even at the site of rupture, but it is entirely free of cicatrices and mobile. After puberty the tunica albuginea of the ovary is hardened to such an extent that complete resorption of the ovary is prevented. In these cases the ovary becomes a necrotic mass of tissue, and there is a calcified mass in the connective-tissue capsule, which may lie in the pouch of Douglas or elsewhere in the abdominal cavity, even adherent to the peritoneum.

The author discusses the 34 cases reported in the literature since 1894 and adds 5 cases of adnexal defect of his own. In 3 of the latter a tube and ovary were missing and in 2 others the tube was missing. The patients had never been operated upon before. On the basis of the cases reported from the literature and his own cases, the author shows that the defects occur on both sides with equal frequency. Judging from the literature, most of the defects should be primary and originate from developmental disturbances. According to the author, however, such aplasias are extremely rare, and he states that in this type the absence of the derivatives of the homolateral wolffian duct, the kidney and the ureter, is demanded. In the remaining cases the defect originated secondarily and was produced either by strangulation or torsion during intra-uterine or extra-uterine life. The most common form of defect is the simultaneous absence of tube and ovary, but the ovary or tube alone may be missing.

LOUIS NEUWELT, M.D.

MISCELLANEOUS

Leventhal, M. L., and Solomon, E. M.: The Therapeutic Value of Tubal Patency Tests in Sterility and Infertility. *Am. J. Obst. & Gynec.*, 1941, 41: 628.

The effect produced by insufflation which makes possible ensuing pregnancy may be explained almost entirely on a mechanical basis. The restoration of partial or complete patency in diseased tubes has been repeatedly demonstrated. Obstructions such as inspissated mucus within the tubal lumen may be expelled, a tortuous tube may be straightened and adhesions may be broken down. The value of pertubation in curing sterility is especially demonstrated in patients in which some associated pathological process causes interference with tubal function.

Observations are recorded based on the investigation of the tubal patency test as a therapeutic measure in sterility. In a series of 133 patients in whom the patency test could be evaluated, 54, or 40.6 per cent, became gravid. Of 114, or 85.7 per cent, of the patients in whom patency in one or both tubes was demonstrated, 51, or 45 per cent, conceived. Of 19, or 14.3 per cent, of the patients in whom no patency was demonstrated to gas or oil, 3, or 15.8 per cent, conceived. Twenty-eight, or 21.5 per cent, of the patients became pregnant within two months of the test, the pregnancy being attributable directly to the procedure. Coitus immediately preceding insufflation probably added to the high percentage of successes and was attended by no ill effects.

An analysis of the pathological conditions which contribute to tubal obstruction is presented. The cure of sterility in tubal obstruction is accomplished by a re-establishment of tubal function and patency due to the mechanical effects of pertubation. The relative merits of insufflation and lipiodol instillation as therapeutic agents are considered. Lipiodol instillation is superior to gas insufflation both from a diagnostic and therapeutic standpoint.

EDWARD L. CORNELL, M.D.

Albright, F., Smith, P. H., and Richardson, A. M.: Postmenopausal Osteoporosis; Clinical Features. *J. Am. M. Ass.*, 1941, 116: 2465.

Adult bone is continuously undergoing new formation and resorption. Consequently, the total amount of bone may be less than normal either because there is accelerated resorption, as is true in hyperparathyroidism, or because there is inadequate formation of new bone. Too little bone may be formed either because osteoblasts fail to lay down sufficient osseous matrix, as is true in osteoporosis, or because the matrix is not calcified, as in osteomalacia and rickets.

It seems probable that osteoblasts produce the enzyme phosphatase. Consequently, the serum-phosphatase level can be considered an index of osteoblastic activity; there is no increase with

osteoporosis. Since osteoporosis is not a disease which involves the calcium metabolism, the serum calcium and phosphorus levels remain at normal values.

Many factors may be responsible for osteoporosis, viz., disuse, dietary deficiencies, gastric hypoacidity, repeated pregnancies, thyrotoxicosis, senescence. and Cushing's disease. The atrophy of disuse is well recognized and is probably responsible for much of the generalized osteoporosis seen in older persons. There is no unanimity of opinion about the role played by diet in the production of osteoporosis. However, the authors admit that an increased availability of calcium and phosphorus might curtail bone resorption. Repeated pregnancies tend to drain the body's supply of calcium and consequently are an important predisposing factor to osteomalacia, but they probably are of no import in the causation of osteoporosis. With longstanding thyrotoxicosis there is an increased excretion of calcium in the urine and feces; this condition may predispose to osteoporosis.

Like the skin, hair, and elastic tissue, the bones atrophy in old age; consequently, fractures of the femur are common in senescence. This atrophy is osteoporosis and it is designated "senile osteoporosis." Consequently, all patients over sixty years of age have been excluded from this study of postmenopausal osteoporosis.

There is included a detailed analysis of 42 cases of generalized osteoporosis without obvious cause. By the term "generalized," the authors mean that the process was not restricted to one vertebra or one extremity, although all of the bones were not necessarily involved. Forty of their patients were women, all of whom had passed the menopause. The average time of onset of the symptoms was nine and one-half years after a physiological menopause and thirteen and two-fifths years after an artificial menopause.

Postmenopausal osteoporosis has a predilection for the spine and pelvis; the long bones are involved only in severe cases and the skull is usually not affected. The common clinical syndrome results from a vertebral lesion and a characteristic history is as follows:

A woman who is about ten years past the menopause receives a minor jolt; she experiences pain in the back and a roentgen examination of the spine reveals osteoporosis with a crushed or fractured vertebra, a fish vertebra, or herniation of the nucleus pulposus through the end-plates. Urinary calculi are not uncommon, probably because there is increased excretion of calcium in the urine during the early stages of osteoporosis. Furthermore, these patients are likely to show their age prematurely and their skin is quite thin; all of this suggests that the atrophy is widespread and is not restricted to the bone matrix.

The results from treatment with estrogens and other agents will be published later.

GEORGE H. GARDNER, M.D.

Michailowsky, B., Scherschever, D., and Rechine, M.: Secondary Lesions of the Urinary Bladder in Cancer of the Genital Tract in Women (Sekundaere Erkrankungen der Harnblase beim Genitalkrebs der Frau). *Akuš. i Ginek.*, 1940, 11: 25.

While the encroachment of cancer of the genital tract in women upon the urinary bladder by direct extension is quite frequent, cancer metastasis of the bladder wall is seldom encountered. The phase of the primary growth plays no role in the metastatic picture. Metastases are found in the wall of the bladder in cases of fully operable cervical cancer. The involvement of the bladder by extension of the tumor is more frequent if the primary site of the tumor is the anterior lip or wall of the cervical canal. When the primary site is in the posterior wall involvement of the bladder will rarely be found. The clinical symptoms of secondary cancer of the bladder are few and uncertain.

The only certain method of diagnosis is cystoscopy. The authors differentiate the following:

1. The mucous membrane with widened vessels, and uneven and thickened portions, which results from pressure of the tumor on the posterior wall of the bladder.

2. The mucous membrane with gross thickening and transverse folds which reach from the sphincter to the middle of the bladder. Often a trabeculated bladder results.

3. A cushion-like anterior convexity of the bladder which finally occurs.

4. Necrosis and a superimposed fibrinopurulent diffuse cystitis, and fistula formation. In cases with this finding cystoscopy is impossible because of the reduced capacity of the bladder.

There is not a strong parallel between cases of cervical cancer and cases of cancer of the bladder. One can find disturbances in voiding early in cases of cervical cancer, but in cases of further advanced cervical cancer they may be absent.

The author has compiled two tables of statistics on 42 non-operative cases and 34 operative cases of cancer in women and their bladder disturbances. The operability and healing of cervical cancer depends essentially upon involvement of the bladder. The most certain aid in their diagnosis is cystoscopy.

(R. GUTZEIT). MARIAN BARNES, M.D.

Strauss, H., and McGoldrick, J. L.: Fracture of the Femoral Neck Following Roentgen Therapy for Gynecological Malignancy. *Am. J. Obst. & Gynec.*, 1941, 41: 915.

Four cases of fracture of the femoral neck following radiation therapy of carcinoma of the cervix are presented. Repeated roentgenograms were negative for metastases particularly at the sites of fracture. Many roentgenograms disclosed no osteitis fibrosa, nor any destructive, neuropathic, or other recognizable bone disease entities. It is generally conceded that syphilis is not an etiological factor in this condition. The incidence of fracture of the femoral neck in cases of gynecological carcinoma treated by

roentgen therapy is higher than that observed in a similar age group of the population.

Senescence certainly could not be an important factor in the first patient, who was only thirty-eight years old at the time of death. Obesity can be ruled out as a cause, since the patients at most weighed between 96 and 140 lb. during the period of treatment.

Severe trauma is entirely excluded because the first patient was bedridden except for the necessary examinations, and the others gave no such history. At no time did they complain of sudden sharp pain. The fracture was insidious and was diagnosed fortuitously in the first case during roentgenographic examination of the colon with barium. Only one and one-half months previously the femur and pelvis were roentgenographically negative. Absence of bilaterality does not affect the pathogenesis previously ascribed. If these patients live long enough, it is not improbable that more bilateral fractures will be observed.

Careful histological examination of multiple sections from the fracture site and adjacent bone revealed no metastatic involvement.

In the case given an autopsy, the intervening tissue had necessarily been irradiated as the right lateral trochanteric port received 3,000 roentgen units, and the depth dose to the tumor through this port was 840 roentgens calculated at 16 cm. depth. The skin showed marked bronzing and epithelial desquamation. Subcutaneous induration, ureteral occlusion, intestinal obstruction with stenosis, and multiple fistulas were also present. All of these changes were bilateral. Because of the proximity of the femur to the surface, the depth dose to the bone and its vascular supply is practically the same as the surface dose. This must be borne in mind in evaluating the term "relative radiation resistance." Excessive dosage of roentgen therapy, whether given in one prolonged cycle or in smaller repeated cycles, imperceptibly reaches dangerous proportions, the consequences of which become more serious with the lapse of time. The pathological findings of the autopsy are characteristic of radiation effects.

EDWARD L. CORNELL, M. D.

Wetterdal, P.: The Use of Heparin in the Prevention of Thrombosis after Gynecological Operations (Ueber die Anwendung von Heparin als Prophylacticum gegen Thrombosen nach gynaekologischen Operationen). *Zentralbl. f. Gynaek.*, 1941, p. 173.

The author demonstrates the value of heparin in the prevention of thrombosis. After operations for myoma and prolapse, thrombosis and embolism frequently occur, particularly in the cases of fat, elderly anemic women as well as those of women with damaged hearts and those who have previously suffered from thrombosis.

The author gives heparin for eight to ten days after the operation; 50 mgm. of heparin are given at 8, 12, and 4 P.M.; and 100 mgm. are given at 8:00 P.M. The first injection is given eight hours after the operation. Heparin was used in 132 cases, and for treatment in 22 cases. The results were completely satisfactory; there was only 1 failure, in a patient who had a definite tendency toward bleeding.

The author does not wish to draw any general conclusions on the basis of his comparatively small number of cases; however, he asserts that there is a comparative lack of danger in the use of heparin.

(RUDOLF HEEMEYER). JACOB E. KLEIN, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Torpin, R., and Hart, B. F.: Placenta Bilobata. *Am. J. Obst. & Gynec.*, 1941, 42: 38.

From this present study of a large series of cases by the fetal-sac distention method, it has been found that most of the placentas consist of only two lobes, one of which is usually primary and much larger than the other. It is also apparent that the two lobes usually lie one on the anterior and one on the posterior wall of the uterus and that the two lobes are joined together either at the side or over the apex of the uterine cavity.

The condition has been shown to be associated not infrequently with low implantation of the placenta, a double type of placenta previa being formed. This probably has been mistaken for placenta previa centralis. EDWARD L. CORNELL, M.D.

Kirchner, O.: Results in the Treatment of Placenta Previa at the City Gynecological Clinic in Essen in the Years from 1923 to 1937 (Ueber die Ergebnisse der Placenta praevia-Behandlung an der Staedtischen Frauenklinik in Essen in den Jahren 1923-1937). Muenster i. W.: Dissertation, 1940.

Among 8,372 labors, there were 120 cases of placenta previa (1.43 per cent). Twenty-eight were in primiparas, 59 were in para-ii to para-v's, 22 in para-vi to para-x's and 11 in para-xi to para-xviii's. The following methods were employed in treatment:

In 9 cases there was conservative expectant treatment of spontaneous delivery (2 dead children); in 5, rupture of the membranes (2 dead children); in 17, metreurysis (14 dead children and 2 dead mothers); in 10, Braxton-Hicks version (1 dead mother and 9 dead children); in 6, version and extraction (6 dead children and 1 dead mother); in 11, colpohysterotomy (9 dead children), and in 62, abdominal cesarean section (11 dead children).

(NOTHDURFT). JOHN W. BRENNAN, M.D.

Benedek, A.: The Fate of the Fetus after Threatened Abortion (Das Schicksal der Frucht nach drohender Fehlgeburt). *Ztschr. f. Geburtsh. u. Gynaek.*, 1941, 122: 106.

The author reports 61 cases in which abortion was threatened one or more times during the pregnancy, but with cessation of the danger the pregnancy went on to full term and resulted in delivery. Thirty-five of the women were between the ages of twenty and thirty, and 21 between thirty and forty; 2 were under twenty years and 3 were over forty. Twin pregnancy was present once. In 31 cases spontaneous abortion had taken place before and in 2 the history showed abortion four times.

In cases of abortion we must think of two causes: (1) functional disturbances of the endocrine system, and (2) deficient absorption of the vitamins, especially Vitamin E. According to Seguy both of these causes are related and are due to the same disturbances. The 61 patients with threatened abortion left the clinic with retention of their pregnancy; but in 8 instances there were later bleedings and low abdominal cramps. In 1 of 4 cases with later toxicosis, eclampsia developed. Furthermore, there was the 1 case of twin pregnancy and 1 of icterus gravidarum. These 6 complicated cases ended with 5 full-term and 2 premature births. In the total cases there were 45 births at term. The number of premature births was relatively high. In a large series of cases they seem to include from 5 to 10 per cent of the births. The developmental disturbances found were polydactylism, atresia of the small intestine, and hypospadias. If we remember that malformations occur in about 1 per cent of the cases (1.3 per cent of 17,800 according to Naujoks and 0.6 per cent according to Mal), we may consider that 3 in 62 cases is high (4.8 per cent).

Fifty-three of the babies left the clinic alive. Thirty-two of these could be observed later and of these 9 boys and 13 girls, or 22 (17 full-term and 5 premature) were perfect. Body and mental defects were found later in 10 children, 5 boys and 5 girls, of which 4 were born at term and 6 prematurely. A prematurely born girl died on the nineteenth day after birth of congenital weakness. Two of the 10 defective children had their defects from birth. In addition, 3 others of the 10 had severe anomalies. One eight-year-old microcephalic idiot has Little's disease. Another microcephalic idiot is eight years old. One nine-year-old child has dorsal scoliosis; it is mongoloid and mentally deficient. Four of the 10 children had severe defects and all four of them had been born prematurely. It must be emphasized that in these 10 cases with developmental defects the possibility of intracranial hemorrhage was not present at birth, and also that no later evidence of hemorrhage was found. It is impossible to state which of the numerous possibilities caused the anomalies.

We may draw the conclusion that among the cases of pregnancy in which abortion threatens without an apparently good reason, premature labor and malformations will occur in greater number than among normal cases and that in the children who survive there will be more bodily and mental defects. (LIEDMANN). LEO A. JUHNKE, M.D.

LABOR AND ITS COMPLICATIONS

Patton, G. D., and Mussey, R. D.: The Value of Calcium in Labor and in Uterine Inertia. *Am. J. Obst. & Gynec.*, 1941, 41: 948.

The authors undertook investigation of the effects of the intravenous administration of calcium salts in labor for two reasons: (1) they questioned whether

calcium might relieve the pain of uterine contractions; and (2) they wished to determine the effect of calcium on the contractibility of the human uterus during labor.

The 26 pregnant women who were observed in the authors' study were on a private and semi-private obstetrical service. They were at or near term and were either in labor or were undergoing attempted induction of labor. These conditions made it impossible to complete the observations concerning every patient. Calcium gluconate was used exclusively in the work, because it is less irritating locally than other calcium salts.

No relief of labor pains resulted from the injection of calcium. In fact, in many instances the intensity of the pain was increased.

The effect on uterine contractions was one of stimulation. Twenty-four of the 26 patients experienced an increase in the frequency of contractions. Fifteen of the 26 patients experienced an increase in the intensity of the contractions, and this number includes 1 patient in whom the contractions did not increase in frequency. The duration of each contraction was not changed much from the duration of contractions in the average labor. In no case did tetanic spasm of the uterus occur, such as frequently results from the administration of injudicious doses of the oxytocic principle of the posterior lobe of the hypophysis.

Four cases were reported to depict the decided effect which may be obtained by the administration of calcium.

Twenty-three of the 26 patients experienced definite stimulation of the uterus, in the form of an increase in either frequency or intensity of contractions, or both, after the administration of calcium gluconate. One of the 26 patients experienced no increase in stimulation of the uterus over that degree of stimulation which commonly would have occurred had she not received calcium gluconate. There was no change in the uterine contractions after the administration of calcium, and the content of calcium in the blood did not increase twenty-six minutes after such administration. However, the intensity of uterine contractions increased markedly forty-five minutes after the injection of calcium and the delivery of the child occurred spontaneously five hours later. The increase in uterine contractions was so transitory in 2 cases that it could not be considered a true stimulation. One patient was not in labor; Braxton Hicks' contractions increased after the injection of calcium, but she experienced no true labor pains. Another patient also was not in labor. The medical induction of uterine contractions by means of castor oil and 10 injections of the oxytocic principle of the posterior lobe of the hypophysis (pitocin), 2 minims at each injection at thirty-minute intervals, had been completed four hours previously, and she was experiencing mild pains every five minutes at the time the authors began treatment. After she had received calcium, the pains increased in frequency so that they occurred every three minutes, but they ceased after fifteen minutes. The value for calcium in the blood was low and did not increase much.

In 3 of the 23 patients for whom treatment was successful, the increase in contractions was of short duration.

In 4 other of the 23 patients in whom treatment was successful, no progress toward the desired objective was noted, despite the increase in uterine contractions.

In the remaining 16 cases of the 23 in which the administration of calcium was successful in increasing the effectiveness of uterine contractions, the patients progressed uneventfully to parturition after the injection of calcium. Of these patients, 13 were delivered within four hours and 1 each was delivered in five, seven, and nine hours, respectively. All but 1 gave birth to infants spontaneously. For the one who did not, delivery with the low application of forceps was done because of slowing of the fetal heart.

No marked systemic effect was observed after the administration of calcium. Five of the 26 patients regurgitated the gastric contents during the injection, but even these patients experienced little nausea. Regurgitation was not considered to be an indication for discontinuance of the injection of calcium.

In general, systolic and diastolic blood pressures and pulse pressure tended to show an increase when readings were made five minutes after the injection of calcium. The rate of respiration did not change more than 6 per minute for any patient, and the increase and decrease was distributed approximately equally. Variations in the blood pressure and pulse after the injection of calcium were as inconclusive as those published by other investigators.

A vasomotor wave, characterized by the subjective feeling of warmth in the patient's skin, could be induced at will by the rapid injection of a solution of calcium gluconate. This symptom was not a cause for complaint if the rate of injection was 4 c.cm. per minute, or less, of the 10 per cent solution.

The effect of the injection of calcium upon the content of calcium in the blood was not constant. Whether or not results would be the same if calcium were administered to non-pregnant women, it would be difficult to predict. The calcium content of the blood increased during the first few minutes (five to thirty minutes) after the injection of calcium in 19 of 20 cases in which determinations were made both before and from five to thirty minutes after such injections. The increase, however, was not proportional to the amount of solution injected, or to the quantity of solution of calcium gluconate injected per kilogram of body weight. The increase expressed in milligrams of calcium per 100 c.cm. of blood varied from 0 to 2.72 and the average increase was slightly in excess of 1.32, based on the calculation for 21 patients, and not on all 26 of the series.

A few patients complained of a sensation of faintness and of profuse perspiration during the injection

of the calcium. Reductions of values for blood sugar of from 10 to 31 mgm. per 100 c.cm. within from five to fifteen minutes after the intravenous injection of calcium salts have been reported. The sensation of faintness and complaint of profuse perspiration previously mentioned may be referable to the temporary presence of hypoglycemia. The symptoms disappeared after the injection had been completed, and in no case was it necessary to cease administration. The administration of calcium was discontinued for from thirty to sixty seconds, however, as a precautionary measure. None of the babies born to these 26 mothers exhibited any ill effects referable to the administration of the calcium.

The chief contraindication to the intravenous administration of calcium salts is the presence in the body of drugs of the digitalis group. Digitalis and calcium exert an additive effect on the heart, so that there is danger of the production of ventricular standstill if the two drugs are used concomitantly. Theoretically, a value for blood sugar which is already low may be further lowered to a point at which hypoglycemic symptoms will be produced in the patient. Glucose administered intravenously would in such circumstances counteract the production of these symptoms, so that the possible production of hypoglycemia is not to be considered a contraindication to the administration of calcium if the value for blood sugar is carefully maintained at normal by means of the administration of glucose.

It seems probable that stimulation of the uterus by the administration of calcium may be employed to good advantage clinically in cases of uterine inertia. Utilization of the effects of calcium was unsuccessful when the patient was not definitely in labor. The duration of the effect of calcium appears to be from two to three hours. If the calcium has not accomplished its purpose within this time, there seems to be no reason why it should not be administered again. Even though calcium does increase the frequency and intensity of uterine contractions, it cannot be expected to overcome the dystocia which is produced by pelvic disproportion or by improper position of the presenting part, and the fact that it does not overcome such a type of dystocia would be an advantage rather than an objection to its administration. The obstetrician need not fear that rupture of the uterus would result from overstimulation by calcium in such cases of dystocia. The ideal case in which to use calcium would be one in which labor has been definitely established, in which the uterine contractions are from weak to moderate and occur less often than every three minutes, and in which there is no obstruction present to hinder passage of the presenting part. Dilatation of the cervix is of no moment. In such a case it could be reasonably expected that the administration of calcium would increase the frequency and intensity of uterine contractions so that labor would be terminated sooner than would be the case if calcium had not been employed. If calcium should be used therapeutically, hard, frequent uterine contractions would render its administration unnecessary, but in the authors' study no harm resulted from its use in such instances. Comparatively small doses of analgesic agents in the form of pentobarbital sodium or elixir of paraldehyde were administered orally to some of these patients according to the usual indications for such agents, although care was exercised not to employ the drugs until the effect of the calcium had been established. It would seem prudent to withhold analgesic agents from calcium-treated patients who have uterine inertia until definite progress has been made. If analgesic agents are administered, they must be used with the knowledge that they may defeat the purpose of the calcium.

The authors concluded that the administration of calcium will not relieve labor pains. The administration of calcium will increase the intensity of uterine contractions and will decrease the interval between contractions, but will not increase the duration of contractions. It is most useful in stimulation of the uterus in cases of inertia in the first or second stage of labor, but it cannot be expected to overcome severe dystocia. The administration of analgesic agents, such as pentobarbital sodium and paraldehyde, may defeat the purpose of calcium in some cases of uterine inertia. The administration of calcium apparently has no ill effects on newborn babies whose mothers received calcium intravenously during labor. On the basis of reports in the literature it would appear that calcium should not be administered if a drug of the digitalis group has already been administered.

Beck, A. C., Taylor, E. S., and Colburn, R. F.: Vitamin K Administered to the Mother During Labor as a Prophylaxis Against Hemorrhage in the Newborn Infant. *Am. J. Obst. & Gynec.*, 1941, 41: 765.

Clotting activity was studied on the first, second, and fourth days of life in a series of 200 infants. Vitamin K was given during labor to the mothers in alternate cases. A study of the control infants shows that on the first day of life clotting activity is approximately 70 per cent of that which is observed in normal adults. A physiological fall in prothrombin usually occurs on the second day. This fall at times may reach dangerously low levels. Fifty per cent of the infants whose clotting activity fell below 35 per cent of normal values showed evidence of hemorrhage. By the fourth day, clotting activity values tend to approach the level of those on the first day of life and are said to reach this level by the sixth day.

Clotting activity approaching that observed in the normal adult may be obtained on the first day by the prophylactic administration of Vitamin K to the mother during labor. Vitamin K, administered to the mother during labor, also prevents the physiological fall in prothrombin values which is commonly observed on the second day of life. Only one infant in a series of 100 whose mothers received Vitamin K during labor, had a low value for clotting activity

and, in this instance, it was 38 per cent of the normal adult value on the fourth day only.

The use of Vitamin K during labor and antenatally should prevent some of the hemorrhages which occur in the newborn infant. Only 5, or 0.5 per cent, of 1,022 infants whose mothers received Vitamin K showed any evidence of hemorrhage, in contrast to 21, or 2 per cent, of 1,037 control cases. In this series of 2,059 cases, in which the alternate mothers received Vitamin K, it appears that this drug reduced the incidence of hemorrhage approximately 75 per cent in the newborn infant. Vitamin K, accordingly, should be very valuable in reducing the incidence of hemorrhage in all newborn infants. This should be true especially when they are born prematurely or after long labors and difficult operative procedures. EDWARD L. CORNELL, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Hernuss, K.: The Use of a Sulfonilamide Preparation in the Puerperium (Ueber Verwendung eines Sulfonilamid-Praeparates im Puerperium). *Muenchen. med. Wchnschr.*, 1941, 1: 20.

Attempts to use sulfonilamide preparations in puerperal infections gave surprisingly good results. Albucid of the Schering firm was employed and was given exclusively by the intramuscular route in order to obtain a more continuous action. Timely and constant administration as well as a sufficiently high dosage of the substance were important for the success of the treatment. The author observed the best results from the prophylactic use of albucid which was injected in daily doses of 5 c. cm. for at least three days in cases threatened by infection; the preparation was given for as long as one week under control of the blood picture in persisting sepsis. No local or general damage has been observed in about 100 injections given up till now, and the drug has been well supported.

The demonstration of the presence of albucid was made by a personal method: the addition of a few drops of Ehrlich's aldehyde solution produces a yellow color in body fluids containing albucid. By this method it was possible to demonstrate the passage of albucid into the cerebrospinal fluid, the lymph spaces, and the mother's milk. The concentration of albucid in the milk was so low that there was no danger of the child's being injured.

(K. HEISING). RICHARD KEMEL, M.D.

Goodall, J. R.: Gynecological and Puerperal Thrombophlebitis Contrasted with Phlegmasia Alba Dolens. *J. Obst. & Gynaec. Brit. Emp.*, 1941, 48: 220.

Goodall, of Montreal, presents a comparative didactic discussion of postoperative and puerperal thrombophlebitis contrasted with phlegmasia alba dolens as to etiology, pathology, diagnosis, prognosis, and therapy.

Thrombophlebitis, in Goodall's opinion, cannot occur without infection, although the agent may be mild and systemic reactions absent. The origin, in the vast majority of cases, is from a "diseased, traumatized mucous membrane." Phlegmasia is an infection and blocking of the minute lymph channels of the tissues involved. The condition usually occurs primarily in the uterus, the cervix, or both. It may remain localized or spread widely, involvement of the leg representing probably the most common extension.

Clinically, the two diseases in their early stages are indistinguishable and rarely diagnosed. They may be suspected when "temperature and pulse rate show indications of a symptom-free infection following operation or labour." Thrombophlebitis often is first diagnosed by its embolic or metastatic complications. Phlegmasia is recognized, commonly, after extra-uterine spread has occurred and marked "involvement of the pelvic cellular tissues, or those of the leg, has taken place."

The chronic sequelæ of phlegmasia are more distressing than those of thrombophlebitis. The former consist of frequent persistent pain in the part involved and permanent lymphatic block producing plasma edema of the tissues below the site of blockage. If the infection is prolonged an extensive marked incapacity results.

The therapy of phlegmasia is discussed. In the chronic state topical applications are futile and cervical operations usually are contraindicated. Should pregnancy occur, every effort is made after delivery to hasten involution of the uterus with stimulants. In addition every means of heightening the patient's resistance should be used, chief among which are the reticulocellular activators; repeated blood transfusions; or small doses of insulin, of thyroid, or of all three, under careful supervision; and a well regulated diet; sunshine, natural or artificial; and heat. WILLARD G. FRENCH, M.D.

NEWBORN

Lund, C. J.: The Prevention of Asphyxia Neonatorum. *Am. J. Obst. & Gynec.*, 1941, 41: 934.

The rational approach to the problem of asphyxia neonatorum is by prophylaxis, notwithstanding the voluminous literature concerned with therapeutic methods. Analysis of the etiological factors of asphyxia as seen in 2,006 consecutively born infants reveals the following:

1. *Parity.* Asphyxiated babies occurred in 18.9 per cent of the primiparas, and in 11 per cent of the multiparas, but after the eighth child asphyxia increased with parity.

2. *Prenatal complications* increased asphyxia from 11 per cent in the uncomplicated cases to 26 per cent in the complicated cases. Metabolic diseases, soft and bony pelvic abnormalities, toxemias, multiple pregnancy, and diseases of the gastro-intestinal and urinary tracts were followed by the greatest incidence of asphyxia.

3. *Prematurity* was the greatest single factor in this series, most dangerous when combined with

analgesic drugs; asphyxia was found in 70 per cent of these cases.

4. *Presentation and position.* Breech presentation was followed by asphyxia in 27 per cent of the cases, occiput posterior position in 18.2 per cent, and occiput anterior presentation in 12.2 per cent.

5. *Duration of labor.* Only when the first stage was over thirty hours was there a marked increase in asphyxia. A second stage of over one and one-half hours was followed by a progressive increase in asphyxia.

6. *Type of delivery and trauma.* Spontaneous deliveries showed asphyxia at a rate of 10 per cent. The use of non-volatile analgesics before operative delivery greatly increased asphyxia.

7. *Complications of labor.* Variations in rate and rhythm of the fetal heart, maternal bleeding, cord prolapse, operative dystocia, and prolonged labor were accompanied by asphyxia neonatorum in from 35 to 55 per cent of the cases. Uncomplicated labor resulted in asphyxiated infants in 12 per cent of the cases.

8. *Analgesics.* The analgesics studied were primarily heroin and morphine, with or without scopolamine. In spontaneous deliveries heroin stood midway between the group receiving no sedation and that receiving morphine. This advantage was lost following operative deliveries. Repeated administration of heroin was followed by increased asphyxia in spite of its rapid action.

9. *Medical induction of labor* had little effect on asphyxia.

10. *Infant complications* increased from 17 per cent to 45 per cent when the infant was asphyxiated at birth. Ten cases of permanent damage of the central nervous system were found; 5 of the infants had had asphyxia at birth.

The individual evaluation of every obstetrical case on the basis of fetal asphyxial risk, as well as a general obstetrical risk, is advised. Prenatal care and the conduct of labor on this basis should result in a substantial reduction of the incidence of asphyxia neonatorum. EDWARD L. CORNELL, M.D.

MISCELLANEOUS

Olsen, A.: Nursing under Conditions of Thirst or Excessive Ingestion of Fluids. *Acta obst. et gynec. Scand.*, 1940, 20: 313.

Although the domestic cow is considered the best milk-producing animal yet developed, it has never been found that lactating cows need or would take a greater amount of fluids than dictated by their normal thirst. To evaluate the common teaching that a lactating woman should "push fluids" beyond the satisfaction of her daily thirst, the author studied the relationship between fluid intake and milk output in 13 nursing mothers. In successive periods of from three to five, and in 4 cases ten days each, the daily fluid intake was made half or double the average normal amount desired before the experiment. The following may be concluded:

Even great variations in the quantity of fluids ingested are in general without effect on the daily breast milk supply. A supplementary fluid intake is not necessary to maintain fluid balance, either in preparation for nursing, or to augment the breast supply. The mother will suffer from thirst long before the baby; hence the amount of fluids to be consumed may be left entirely to physiological regulation. The development of hypogalactia cannot be arrested by forced drinking. Forced drinking does not increase the milk supply and may actually be harmful.

E. S. BURGE, M.D.

GENITO-URINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Schroeder, C. H.: Cystic Hemorrhagic Struma of the Adrenal Gland (Die Struma suprarenalis cystica haemorrhagica). *Arch. f. klin. Chir.*, 1940, 199: 595.

Up to the present 20 cases of blood cysts of the adrenal gland have been reported, of which 16 were operated upon, 11 with success.

In an additional case reported by the author there was an enlarging tumor in the left side of the abdomen of a sixty-one-year-old woman which was associated with a sensation of pressure and pain noticed for one year. There was no remarkable past history, except that the woman had had 12 normal confinements. Clinical examination revealed a large retroperitoneal tumor which was not disturbing the function of the left kidney to any extent but had displaced it downward and twisted it about 90 degrees. At the operation, performed through an oblique lumbar incision on the left side with resection of the twelfth and eleventh ribs, the entire tumor which extended downward as far as the bladder was removed. The tumor had to be separated by sharp dissection from the spleen, the descending colon, and the bladder, and the left kidney had to be sacrificed. A large cyst measuring 27 by 14.5 by 12 cm. was obtained which contained about 4 liters of a chocolate brown mixture and colored gelatinous masses; at its upper pole there still remained the remnant of the left adrenal gland. Stripping of the epithelium revealed only granulation tissue with abundant foreign-body giant cells and deposits of hemosiderin. The left kidney revealed an old ascending nephritis. The adrenal gland appeared to be the site of origin of the cyst; the adrenal-gland cells could be stripped away in other cases (Kuettner, Brand).

It is possible that this was an adenoma, which, just as a goiter, changes itself into an ever-increasing cyst; so that the name cystic hemorrhagic struma of the suprarenal gland would be applicable; however, hemorrhage which has been frequently seen in the adrenal glands of the newborn might be the cause of the cyst. Finally, scattered rests of the wolffian body as well as a lymphangioma might be considered as the cause of such a lesion. It is noteworthy that women have suffered from this lesion much more frequently than men, a fact which may be related to the genital function and a greater tendency toward bleeding. Up to this time the diagnosis has not been made before operation, and beyond the recognition of a tumor at the upper pole of the kidney nothing can be determined. The exact evaluation of retrograde and excretion pyelography could be investigated further. Aspiration with the recovery of a chocolate-brown fluid also is an important diagnostic finding. Hemorrhagic cysts of the spleen as well as perirenal hydronephroses usually have a previous history of trauma. Hemorrhagic cysts of the pancreas lie more toward the midline. At operation complete removal of the tumor should be attempted under all circumstances for of 4 cases treated by marsupialization, 3 terminated fatally. (Max Budde). John R. Paine, M.D.

Fowler, H. A.: Bilateral Renal Ectopia. A Report of 4 Additional Cases. *J. Urol.*, 1941, 45: 795.

Bilateral renal ectopia is the rarest type of renal anomaly encountered, either clinically or at autopsy. Both kidneys are congenitally misplaced and may lie at the same or different levels. Fusion may occur, but this is apparently rare. In the event of fusion, the conglomerate renal mass may lie deep in the pelvis and form the so-called lump, cake, or shield kidney. The author does not know of any such case that has been observed clinically. The incidence of renal ectopia of all types, in autopsy records, varies between 1 in 650 to 1 in 1,500. The Mayo Clinic gives the ratio as 1 in 1,200, but clinically the condition occurred once in 10,000 cases. This discrepancy between the autopsy and clinical incidence is explained by the fact that many cases are asymptomatic and no special examinations were made. Renal ectopia is often found accidentally during an exploratory laparotomy for other conditions unrelated to the kidney anomaly. Under these conditions, no treatment for the latter is indicated.

In reviewing a clinical group of 22 cases the predominant symptom was found to be pain. This is the chief complaint on admission in almost every case. It varies in intensity from a deep-seated ache to intermittent attacks of acute, sharp, stabbing colicky pains. In character, location, and radiation it does not resemble the typical pain of renal or ureteral origin. It is usually referred to the lower abdomen, and suggests a low abdominal lesion involving the appendix, or the pelvic organs in the female. This symptom is, therefore, misleading from the diagnostic standpoint. It is due to a condition within the kidney or ureter itself, the most common being hydronephrosis, pyonephrosis, and calculous disease. Tuberculosis and hypernephroma have not been observed. There is no syndrome characteristic of this anomaly and the condition is of itself asymptomatic. It is only in the presence of lesions such as those which commonly affect a normally placed kidney that symptoms are produced. In one of the author's cases the patient lived to the age of fifty-three years with no symptoms which were referable to her bilateral ectopic kidneys. It was only with the development of pyelonephritis in the left kidney that symptoms were produced. When infection has occurred, pain is often associated with chills and fever, nausea, and vomiting, together with urinary disturbances such as frequency, urgency, and dysuria.

A palpable mass in the lower abdomen is another important finding. This was noted in 9 cases. In 2 others a mass in the pelvis was felt on vaginal and rectal palpation. Unfortunately, this is also likely to be misleading, since it suggests appendicitis on the right side, or an adnexal lesion. Urinary disturbances, when accompanied by pyuria, demonstrable infection, and hematuria, are important symptoms which demand a complete urological examination to reveal the anomaly. Obstruction at the pelvic outlet resulting in pelvic dilatation and hydronephrosis are frequently encountered. In addition to the usual causes, the fact that in some cases the pelvis lies anteriorly, due to failure of normal rotation of the kidney, may account for poor drainage. This condition is often unilateral.

Treatment may be conservative or radical. Intermittent dilatation with ureteral catheters and bougies may be employed. Retention ureteral catheters left in place for several days is a safer method of accomplishing the same purpose. This provides kidney drainage while effecting dilatation, and avoids trauma and edema following intermittent dilatation. Thompson and Pace point out that dilatation is not as successful as it would be in the case of normally placed kidneys, and may do more harm than good. In their experience (unilateral cases), nephrectomy and pyelotomy were the operations of choice. In the bilateral group nephrectomy was done in only 1 case for hydronephrosis and a functionless kidney; the remainder of the cases were treated conservatively. Nephrectomy should not be undertaken lightly. The technical difficulties in dealing with the abundant, anomalous blood supply, the fixation of the kidney, and its inaccessibility will tax the skill of the surgeon of widest experience. Nephrostomy and plastic repair of constriction at the ureteropelvic junction are not reported, and probably are rarely indicated. Infection and pyelonephritis may be expected to respond to treatment in the same manner and to the same methods as those employed in the treatment of similar conditions in kidneys in normal position.

LOUIS NEUWELT, M.D.

Bonanome, L.: Four Clinical Cases of Papillary Tumors of the Kidney Pelvis (Su quattro casi clinici di tumori papillari della pelvi renale). *Ann. ital. di chir.*, 1940, 19: 903.

Four cases of papilloma of the kidney are described in men of sixty-eight, sixty-three, fifty-eight, and forty-eight years. These tumors are rare but are being found more frequently since better methods of diagnosis are available. Some writers have held that all papillary tumors are malignant epitheliomas. However, this is not true, there being no doubt that there are benign papillomas. The tumors in all 4 cases described in this article proved to be pure papillomas on histological examination; and their benign nature was proved by the good results of operation. The first patient operated on is in good health seven years after the operation.

The diagnosis is difficult. The chief symptoms—hematuria, pain, and swelling of the kidney—are common to so many diseases of the urinary tract that they only show the need of further investigation. However, with the aid of urinalysis, and endoscopic and roentgenological examinations, it may be possible to make a diagnosis. Ascending pyelography gives the best results in locating the tumor. Sometimes only a diagnosis of tumor of the kidney can be made. This was true in the author's first case in which descending urography did not give the necessary information and ascending urography was impossible. In the 3 other cases it was possible to diagnose "tumor of the pelvis."

The operation of choice is total nephro-ureterectomy. It is a very serious operation and almost all surgeons prefer to perform it in two stages. The author performed nephrectomy in his cases and after recovery the patients refused any further operation. Only 1 of the patients had a recurrence in the stump of the ureter. The others have had no trouble so far. In his operations the author always ligated and sectioned the ureters first in order to avoid transplantation of the tumor cells into the stump of the ureter or bladder, and then ligated the renal vein separately before isolating the kidney completely. He thinks roentgen irradiation after operation may be useful when histological examination has shown papillary epithelioma.

AUDREY G. MORGAN, M.D.

De Carlo, J.: Postcaval Ureter. *J. Urol.*, 1941, 45: 827.

Since Hochstetter's first reported case of postcaval ureter in 1893, 25 cases have been recorded in the literature. Eight of these were found at operation and 17 were found post mortem. Although this is a rare anomaly, it is not found as infrequently as was formerly thought. This anomaly is gradually emerging from the field of anatomical curiosities. Life is not incompatible with this anomaly and not all cases develop hydronephrosis and hydro-ureter as was formerly believed.

The case reported, discovered during a general dissection, is the twenty-sixth of its kind reported. In the period between 1911 and 1939, this was the only instance of postcaval ureter occurring in 4,185 bodies used at the Daniel Baugh Institute of Anatomy. The body was that of a colored male, aged sixty years. The cause of death was carcinoma of the esophagus. The right ureter, on leaving the kidney, passed horizontally, medially, and ventrally, coursing dorsal to the postcava at the level of the body of the third lumbar vertebra. It next appeared between the aorta and the postcava and immediately coursed caudally and laterally, crossing the ventral surface of the postcava diagonally to reach the right psoas major muscle 4.5 cm. from the midline. The ureter then crossed the right external iliac artery and pursued its usual course to the bladder. Hydronephrosis and hydro-ureter were not present. There was a slight dilatation of the ureter, but this occurred on the psoas major muscle distal to that portion of

the postcava involved in this study. At this point the ureter was 8 cm. wide.

The anomaly results through maldevelopment of the postcava and not of the ureter. The definitive post-hepatic vena cava is comprised of various segments and anastomoses between the paired postcardinal, supracardinal, and subcardinal embryonic venous channels. The renal segment is usually formed by the persistence of certain portions of the subcardinal-supracardinal anastomotic pattern. In the present case the right supracardinal vein played the more important role in the transformation. As the mechanical effect of blood-flow straightened the embryonic vena cava, the ureter was caught by it and pulled medially, which resulted in the location of the adult ureter dorsal to the renal segment of the inferior vena cava.

From these cases the following statistics are taken: Seventeen patients were males and 6 were females; in 3 cases the sex was not mentioned. The ages varied from birth to eighty-four years. Hydronephrosis was present in 18 cases, absent in 7; in 1 case no reference was made to this condition. The greater number of males is attributable to the greater number of male bodies received for dissection and necropsy. Four males and 4 females were found at operation.

The diagnosis of postcaval ureter has never been made postoperatively. In all cases of hydronephrosis on the right side, postcaval ureter should be considered a remote probability. Randall and Campbell claim that in an oblique roentgenogram the postcaval ureter will be found to impinge against the lower lumbar spine, while the normal ureter will fall away from it. Shih remarks that in a pyelogram, winding of the ureter around the inferior vena cava should be borne in mind when one encounters dislocation of the ureter to or beyond the midline. With these roentgen findings and with direct vision obscured by the presence of hydronephrosis, undue pulling to deliver the kidney through the lumbar route and the indiscriminate application of clamps should be avoided because of the danger of fatal hemorrhage following injury to the postcava.

LOUIS NEUWELT, M.D.

Hyman, A., and Leiter, H. E.: Surgery of the Inferior Vena Cava in Urological Conditions. *J. Urol.*, 1941, 45: 813.

The authors have collected 11 cases in which operations upon the inferior vena cava were done, and review a number of features that are not only of scientific interest but are also of considerable practical importance. They give the symptoms and signs of obstructions of the inferior vena cava; a discussion of the literature; the prevention and treatment of accidental injury to this vessel, with the proper control of the resultant hemorrhage; the indications for intentional surgery upon the vena cava; and a presentation of 11 cases.

The symptoms and signs resulting from occlusion of the inferior vena cava depend upon the mechanical obstruction *per se* and upon the cause of the obstruction. Other important factors are the position, the extent, the rapidity, and the completeness of the obstruction.

In obstruction of the lower third, edema of the legs, even in sudden occlusion, is often absent. Its presence is probably due to an associated block of the iliac veins. Edema of the abdominal wall is rare. Superficial collateral vessels are present in well-established cases and are almost invariably present in the groins and over the abdomen and flanks. If they are present on the legs, they are nearly always due to associated involvement of the iliac vein. Albuminuria is rare and, if present, is transitory and slight.

In obstruction of the middle third, sudden occlusions are probably invariably fatal. Edema followed by superficial collateral vessel formation occurs in practically all cases of gradual occlusion. Edema of the abdominal wall is not uncommon. Albuminuria is generally present at first and may be associated with other disturbances of renal function. Gradual occlusion above the renal vessels may, however, not result in even temporary albuminuria.

In obstructions of the upper third, sudden occlusions are fatal. Edema and superficial collateral vessels in instances of gradual occlusion present the same picture as that seen in obstructions of the middle third, except that the caput medusæ is more apt to occur. Obstruction of the hepatic veins is generally associated with disturbed function of the kidneys, liver, and other abdominal organs. Albuminuria is frequent; ascites and jaundice are common. Diarrhea and vomiting may result from congestion of the gastro-intestinal tract.

The collateral circulation in obstructions of the inferior vena cava is a fascinating example of the ability of the circulatory system to adjust itself. It forms the basis for the absence of edema of the legs in obstructions of the lower third of the cava and for the presence of apparently normal urine and normal kidney function, even when the openings of both renal veins are blocked; it explains the reason that a patient may live an active life for twenty-five years or longer with complete occlusion of the inferior vena cava. A review of the literature indicates that ligation of the vena cava below the level of the left renal vein (after a right nephrectomy) will usually be followed by an adequate collateral circulation. Ligation above the entrance of the left renal vein is almost invariably fatal.

The literature reveals that, with few exceptions, the cava has been inadvertently damaged during the course of operations upon the right kidney. The operations were difficult, the kidneys were adherent due to extensive perinephritis, and the pedicles were short, thick, and probably friable. The kidney may even be plastered to the surface of the cava, or the latter may be drawn up and angulated. Such situations are not uncommon in longstanding pyonephroses, tuberculosis, and in renal neoplasms. The authors are very "vena cava conscious" in difficult

types of nephrectomy for fear of caval injury. Thus, in some pyonephroses, subcapsular nephrectomy is preferred when there is most difficult mobilization. This, however, is not good practice in cases of neoplasm or tuberculosis, as in these cases the capsule should be removed. In these cases the mobilization of the kidney, especially near the hilum, is done with considerable caution and preferably under vision. The chief modes of unintentional injury to the cava result from (1) laceration during the separation of the kidney; (2) application of clamps or ligatures to the renal pedicle, where the cava is angulated into the hilum; (3) application of clamps in cases of short, friable pedicles; and (4) avulsion of the renal vein, at its entrance into the cava, by strong traction on the pedicle. One cannot stress too strongly the importance of adequate and good exposure, and when difficulty is anticipated it is advisable to have a large incision and resect one or two ribs before beginning mobilization of the kidney. For large malignant renal tumors a transperitoneal approach is preferred by many surgeons.

Deliberate and intentional surgery of the vena cava has a narrow and limited scope. The Eck fistula is of doubtful clinical value. Tumor thrombi have been removed from the inferior vena cava, and in some cases it was possible to milk the thrombus-bud projecting into the cava back into the renal vein before ligating the latter. In others it was possible to open the renal vein close to the cava and remove the thrombus by expressing it through this opening with a curet or forceps. In large tumor thrombi, the cava may be opened between serrefine clamps, the thrombus extracted, and the opening clamped or sutured. When a small localized invasion of the wall of the cava is present, excision of a part of the wall can be done. Or, if the thrombus is adherent and below the left renal vein, that portion of the cava, theoretically, can be resected. Ligation of the lower third of the cava may also be indicated in certain examples of sepsis in which the lesion is in the pelvis or lower extremities (phlebitis), and in which the infecting organisms are not vulnerable to the various sulfanilamide preparations. The ligation or opening of the inferior vena cava carries little added risk.

The first indication of an accidental caval injury is a sudden filling of the wound with dark, venous blood. The blind application of clamps to control the bleeding must be avoided, as the clamps will most likely not be accurately applied, or the clamping of the duodenum may result in a duodenal fistula. Digital compression is preferable. If this fails, a large pad is quickly packed tightly into the depths of the wound. The wound is then extensively enlarged, with resection of one or two of the ribs if necessary, while the operator controls the hemorrhage. The kidney is removed rapidly. A number of procedures are available for this purpose: packing is the least satisfactory and generally leads to a fatality. With clamps in readiness, the wound is sponged dry and the pressure on the cava slowly released. The opening in the vessel is then quickly clamped with serrefine clamps above and below the point of injury for temporary hemostasis. It is important to note the degree of occlusion to the cava. If one can be certain that the application is below the level of the left renal vein, there is no cause for concern. One of three methods is now available:

The clamps may be left *in situ* and surrounded by gauze. The handles are tied with heavy silk to prevent their accidental opening and covered with a wire basket. After five to seven days they are opened gently, and removed on the next day. This method has been found most satisfactory.

Lateral ligations of the cava are apt to be unsuccessful, as the suture tends to slip off.

Suturing of the rent with atraumatic silk is an ideal method of controlling hemorrhage, but this is time-consuming and should not be attempted if the patient's condition is poor.

Complete ligation of the cava is usually unnecessary; its main danger lies in the fact that it may be difficult to determine whether or not the ligature has been applied below the left renal vein. These patients often require fluids by intravenous drip and transfusions. LOUIS NEUWELT, M.D.

Ascoli, R.: The Immediate Postoperative Treatment, and the Fight Against Recurrence in Operations for Urinary Stone (Die unmittelbare postoperative Behandlung und der Kampf gegen die Rueckfaelle bei Harnsteinoperierten). *Ztschr. f. urol. Chir. u. Gynaek.*, 1940, 45: 401.

On the basis of earlier studies, the author is of the opinion that three factors are of importance in the formation of recurrent calculi following operations for urinary stones: the calcium content of the urine, the phosphorus content, and the urinary reaction. Practically, the deciding factor is the alkaline reaction of the urine. This develops chiefly as the result of the fermentative formation of ammonium, produced by various micro-organisms. The recurrent calculi develop most frequently in the infected cases.

The author considers that the insufficiency of the postoperative treatment is a basis for the bad ultimate results in patients operated for urinary stone. This treatment must be carried out with the greatest exactitude and thoroughness. The postoperative oliguria is to be combated with energy. The lower the concentration of the urine the less will be the chance for the recurrence of stone. The author administers four times within the first twenty-four hours 500 c.cm. of physiological salt solution or dextrose solution, with concurrent continuous rectal drop infusion. Urotropin is administered as a prophylaxis against urinary infection, preferably in the form of amphotropin, in order to be sure of urinary acidification. The increased excretion of urine is not at all harmful to the healing of the wound of operation.

Furthermore, periods of diuretic treatment should be carried out methodically for at least a year follow-

ing the operation. In this the maintenance of a diluted urine is more important than a continuously acid reaction. The volume of urine which is excreted in twenty-four hours must always be determined. The author recommends that at least 2 liters of urine be attained in twenty-four hours. Instead of mineral waters, he recommends equal parts of distilled and well or spring water to be taken mornings on an empty stomach, 2 liters to be imbibed in the course of thirty or forty minutes. This course of diuretic treatment should be carried out two to four times per week. Contraindications to this treatment are heart disease, renal insufficiency, and elevated blood pressure. Beginning several months after the operation, there should be administered at two-month intervals a series of 12 intravenous injections of amphotropin or helmitol.

The author regards the employment of the badly borne and ineffective dietetic restrictions as inappropriate. He permits a mixed diet. It is desirable to avoid alkalinizing materials such as sodium bicarbonate or alkaline mineral waters.

(W. KOENIG). JOHN W. BRENNAN, M.D.

BLADDER, URETHRA, AND PENIS

Warrick, W. D.: Cystitis Cystica; Bacteriological Studies in a Series of 28 Cases. *J. Urol.*, 1941, 45: 835.

Cystitis cystica is a well recognized clinical entity. The fact that the cysts *per se* rarely produce clinically recognizable symptoms is the reason that they have been overlooked in the past. Urologists have for many years recognized their presence in the bladder. The cysts occur not only in the urinary bladder but also in the urethra, ureter, and renal pelvis.

It occurred to the author that no attempt has been made to correlate a series of cases of cystitis cystica from the point of view of bacteriological studies, duration of urinary symptoms, and kind of urinary complications, if any. This article is based on the records of 28 cases of cystitis cystica. It was undertaken with the hope that it might stimulate the correlation of bacteriological as well as clinical findings in these cases.

The diagnosis is most commonly made cystoscopically. Characteristically, the cysts appear as small beads immediately beneath the surface of the bladder and covered only with a very thin layer of mucous membrane. Fine blood vessels may be seen in this covering membrane. The fluid is usually clear and translucent, but may have a slight yellowish cast. The common lesions vary from 2 to 5 mm. in diameter. More often they are observed on the trigon, but frequently they are seen all around the bladder neck. Somewhat infrequently they are seen on the lateral walls and in the dome of the bladder. The cysts are usually discrete and often have a tendency to be arranged symmetrically. Several diseases may give a somewhat similar cystoscopic picture. Included in these are such lesions as bullous edema, urethral polyps at the bladder neck, granular cystitis, cystitis follicularis, and cystitis emphysematosa.

The average age of the patients in the 28 cases studied was fifty-two years, the youngest being thirty-one and the oldest seventy-two. Nineteen (68 per cent) were females and 9 (32 per cent) were males.

The most common organism was the bacillus coli, found in 12 (43 per cent) cases. Eight (29 per cent) showed "no growth." The hemolytic bacillus coli was found in 4 cases (14 per cent), the proteus in 2 (7 per cent), the bacillus pyocyaneus in 1 case (3.6 per cent), and the bacillus diplostreptococcus also in 1 (3.6 per cent). Other organisms previously reported include the staphylococcus aureus, the staphylococcus albus, and short chained cocci.

The significance of these bacteriological studies is interesting. The author believes that he is in a position to refute the age-old saying that all cases of cystitis cystica are associated with bacillus coli infections, since this organism appeared in only 43 per cent of his cases. However, the time which had elapsed since the onset of clinical symptoms was sufficiently long in some cases to have allowed a change in the bacterial flora.

All histories were checked for 4 common urological symptoms. It was found that 93 per cent of the patients had burning on urination, 83 per cent had frequency of urination, 79 per cent had nocturia, and 29 per cent had hematuria. The author does not mean to imply that he believes the clinical symptoms were caused primarily by the cystitis cystica.

There was a great multiplicity of associated urological lesions. These included chronic pyelonephritis (5 cases), renal calculi (4 cases), benign prostatic hypertrophy (4 cases), chronic prostatitis (3 cases), acute pyelonephritis (3 cases), hydronephrosis (3 cases), chronic cystitis (2 cases), and 1 case each of stricture of the urethra, papilloma of the bladder, renal tuberculosis, carcinoma of the prostate, pyelitis, and ureteritis cystica.

There seems to be no definite correlation that can be drawn between cystitis cystica and its associated urological disease.

The author believes that the diagnosis of cystitis cystica would be made more often if microscopic studies were made more frequently as an adjunct to cystoscopy. When an obvious lesion is seen it is not unlikely that the presence of these cysts will be overlooked. JOHN A. LOEF, M.D.

GENITAL ORGANS

Creevy, C. D.: Resection of the "Large" Prostate; Technique and Results. *J. Urol.*, 1941, 45: 715.

This is a report of transurethral resection done in 1,141 consecutive patients at the University Hospitals, Minneapolis, between April 1, 1930, and September 1, 1940. More than one operation was done in 23.9 per cent of the cases. The total mortality for the series was 4.4 per cent, and the average

total hospital stay sixteen and two-tenths days. The average amount of tissue removed rose from 3.3 gm. per patient in 1930 to 33.8 gm. in 1940.

The amount of tissue removed exceeded 30 gm. in 21.9 per cent of the whole series, and in 38.3 per cent of those done in 1940, although the contractures and small prostates, as well as all the operations of beginners are included. Thus it will soon be permissible to refer to the operation with some conviction as transurethral prostatectomy.

JOHN A. LOEF, M.D.

Bruni, P.: One Hundred Cases of Transvesical Prostatectomy (Una centuria de prostatectomie transvescicali). *Ann. ital. di chir.*, 1940, 19: 783.

Fueller, in 1895, introduced the method of complete removal of prostatic adenomas through the bladder instead of simply removing masses that projected into the bladder in that way. Six years later Freyer made improvements in the technique that led to the common adoption of the method. There is still considerable discussion as to the relative merits of transvesical prostatectomy and endoscopic resection as if one must necessarily be superior to the other.

The author discusses the question on the basis of the last 100 cases he has treated by the method of transvesical prostatectomy. They were all cases of definite adenoma of the prostate. He discusses the technique of his operation, the immediate and late functional and anatomical results, and the clinical, endoscopic, and roentgen examination of the cases, and gives tables showing the details of the results.

Summarizing his conclusions he says that there is no rivalry between transvesical prostatectomy and endoscopic resection. The former is the more radical method of treatment and is indicated in all cases in which there is definite adenoma. In small fibrous adenomas, prostatism, sclerosis and hypertrophy of the neck of the bladder, and in the so-called prostatic bars, endoscopic resection gives satisfactory results. If resection were used in these cases it would improve the late results of transvesical prostatectomy.

A history of gonorrhea was not frequent in the author's cases and he does not believe it is an important factor in causing hypertrophy of the prostate. If patients with hypertrophy of the prostate would come for treatment earlier, the results of operation would be better. Careful preparation, the details of which are given, is important. Slow and gradual emptying of the bladder is to be preferred to emptying it at once by cystostomy. Occasionally hemorrhage constitutes an indication for immediate operation. In addition to endoscopic and roentgen study, renal function should be determined.

At present most of the patients cannot be operated on in one stage. Only 7 of the author's patients could be operated on in this way. The period between the suprapubic section and the removal of the adenoma varies; it depends on the general condition of the patient and kidney function, and only to a slight degree on the fear of fibrous transformation of the adenoma. The best anesthetics are novocaine used locally for the suprapubic section, and Schleich's mixture with gomenol for the adenectomy. The patient should be prepared with coagulants and a retention catheter inserted twenty-four hours before the adenectomy. The use of hypertonic salt solution and the hypodermic injection of small amounts of isotonic saline solution are valuable in combating anuria after transfusion.

The operative mortality in these cases was 6 per cent, the most frequent cause of death being heart or circulatory complications. The most frequent postoperative complications were delayed healing of the bladder wound, ascending pyelonephritis, orchiepididymitis, and bronchopneumonia. Electrocoagulation of the fistulous tract was useful in the treatment of delayed healing; if that failed, cure could always be brought about by secondary suture. Adequate postoperative treatment is very important in determining the immediate and late results.

The late results in this series were good in view of the age of the patients. Of 78 patients examined three years or more after the operation, only 6 had died and the ages of these were seventy-one, sixty-four, sixty-four, seventy, seventy-three, and seventy-two, respectively. The deaths were from conditions outside of the urinary tract. The late functional results with reference to micturition were satisfactory. There was a residual urine of from 30 to 150 c.cm. in only 15 of 67 cases examined. The urine was sterile in 52 per cent of the patients examined. There was improvement in the renal function in almost all of the cases. The details are given in the tables. The late results as to sexual function were also good. The late anatomical results in the bladder and urethra were satisfactory; even when they were imperfect they did not affect function appreciably.

Reopening of the bladder wound occurred in only 2 cases in which there was an obstacle to the normal discharge of the urine. When this was corrected the wounds healed again. There was interference with normal urination in only 4 cases: in 2 there was deviation of the prostatic urethra, in 1 a membrane at the neck of the bladder and in the last, a membrane in the premembranous urethra; all of these conditions were corrected without difficulty.

No late complications such as those described by other authors, including prostatitis, orchitis, epididymitis, carcinoma of the prostate, osteoma in the hypogastric scar, and incontinence of urine, were seen in these cases. Calculi of the bladder or urethra developing after operation were not seen. Seven of the patients had stones before operation. There was no recurrence of the adenoma in any case. A mental disturbance was observed in 1 of the patients, but he had had decided evidence of psychic abnormality before the operation.

There is as yet not enough evidence to justify an unfavorable judgment on transvesical adenectomy and certainly not enough to abandon the operation.

AUDREY G. MORGAN, M.D.

Luescher, A.: Concerning 99 Cases of Cryptorchidism and Their Treatment in the Surgical Division of the Zurich Children's Hospital in the Period from 1928 to 1937 (Ueber 99 Faelle von Kryptorchismus und deren Behandlung an der chirurgischen Abteilung des Kinderspitals Zuerich in den Jahren 1928-1937). Zurich: Dissertation, 1940.

This study establishes the difference between retention of the testicle, in which the gland has not descended at all or has been arrested on its way to the scrotum, and ectopy of the testicle, in which the gland is found outside of its route of descent: abdominal and inguinal retention on the one hand, and perineal, scrotofemoral, inguinosuperficial ectopy, and aberrant descent to the back of the penis or to the small pelvis on the other. The historical data on these anomalies are given. The reported frequency varies. Incomplete descent is reported by Wrisberg in 72 of 102 newly born children, by Sachs in 20 of 143 children, by Hofstaetter in 4 per cent of 450 newly born and in 32 per cent of prematurely born children, and by Lotheisen and by Ecches each in 2.3 per cent. Unilateral cryptorchidism is three times more frequent than the bilateral condition, and the right side is more often involved. Among the author's 99 cases there were 44 on the right side, 29 on the left side, and 23 were bilateral.

From the point of view of developmental history, the testicles lie at the level of the second lumbar vertebra behind the peritoneum at the upper medial extremity of the wolffian body during the second month of fetal life; from the fourth month on, they travel through the large pelvis and are found at the internal inguinal ring in the sixth month, and during the seventh month they pass through the inguinal canal. It is not yet known what forces act on the testicular descent. Grauhan invokes organotropism as well as the action of gravity. On the other hand, it must be considered as a phylogenetic phenomenon. Bramann has elucidated the behavior of the vaginal process and of Hunter's gubernaculum. The first reaches the scrotum earlier than the testicle and therefore plays a slight part in the descent of the testicle. It was formerly accepted that the gubernaculum reached from the lower pole of the testicle to the bottom of the scrotum. This is erroneous. It can never be followed further than to the inguinal region, and it turns into the cremaster by inversion.

What then are the causes of retention? It may be produced mechanically by adhesions or by complete or partial narrowing of the inguinal canal, or by abnormal shortness of the vas deferens and its vessels. Among the present cases, there were 5 of abnormal shortness and 4 of loop formation with abnormal length of the seminal cord. In 90 per cent of his operations, Buedinger found strands of scar tissue between the peritoneum and testicle which he attributed to a fetal peritonitis; however, this is a purely theoretical assumption. The author found these strands 10 times, but leaves the question open whether they are the cause or the result of the abnormal position of the testicle. Other causes may be the abnormal formation of the mesorchium and heredity: the author observed these causes 5 times. Atavism or intra-uterine anomalies of position of the fetus may also be the cause. On the other hand, the author found a primary atrophy of the testicle in 5 cases, which condition gives an unfavorable prognosis for the operation. In addition to these causes, Simmon has called attention to hemorrhage as a result of birth injury, especially in pelvic presentations. However, only one of the author's patients had been born in this presentation.

The examination of undescended testicles shows that they are of normal size in adolescents, but they are atrophied in adults. On histological examination Finotti found: (1) earlier arrest of spermatogenesis, (2) signs of degeneration in the specific glandular tissue and in the connective tissue, and (3) an increase in the so-called intermediate cells of Leydig: these cells are always increased and, as a result, the testicle may have a normal size and yet be specifically atrophic.

As the presence of the testicle in the scrotum is indispensable for the development of the spermatozoids, operation must be performed before puberty. However, the male sex characteristics are not impaired in subjects with cryptorchidism because the internal secretion is insured by the well preserved intermediate cells and the cells of Sertoli. Fixed inguinal testicles undergo atrophy more rapidly than those which are loose in front of the external inguinal ring or are retained in the iliac fossa.

Among the associated incidents of undescended testicle hernia should be mentioned first of all. Uffreduzzi observed hernia in 90 per cent of his cases, Brunzuna in 58.9 per cent, and Heinicke in 85 per cent. The author found it in 59 per cent of his cases at operation. Confusion between incarcerated hernia and incarcerated inguinal testicle is frequent. Hydrocele is rare: the author observed it only once. He found phimosis in 4 cases, umbilical hernia in 3, hypospadias in 1 case, and other striking peculiarities in 8 cases. Uffreduzzi mentions that he observed mental inferiority in 10 per cent of his patients, but the author found only 1 imbecile boy in his series. Most of the children did not present any disturbances, and their cryptorchidism was discovered by the school physician. Only 12 had hernial disturbances and 7 complained of incarceration pain, although pressure could not be demonstrated. Eight complained of pain on protracted walking or exercising, and 6 had enuresis; they were not benefited by operation. The greatest danger is torsion: it requires immediate intervention because a torsion lasting more than twelve hours always leads to atrophy. The author observed 2 cases of torsion. On the other hand, he saw 4 cases of incarceration of the inguinal testicle which may be accompanied by fever up to 39°C. Another danger is inflammation caused by traumatism or infection. Malignant degeneration seems to occur 40 times more often in inguinal than in normal testicles; it is

more rare in abdominal testicles. However, there is no doubt that this danger is exaggerated.

The treatment of cryptorchidism may be:

1. Orthopedic. In this type an attempt is made to bring the testicle down gradually by the use of massage.

2. Medical and hormonal. Schapiro has administered preparations of the anterior lobe of the hypophysis and reported 17 successful results. He injected 2 or 3 ampules of prehormone three times a week for from two to three months. Werner had 12 successful results in 17 cases with the gonadotropic preparation of the anterior lobe of the hypophysis. The author cannot state anything about the treatment with sexual hormones. However, he is of the opinion that all cases with complications, those in which the testicle cannot be brought in front of the external inguinal ring by means of massage, and those in which there is probably a connective-tissue mechanical impediment to descent must be operated upon.

3. Surgical. The intervention must be performed before puberty in every case. Some authors recommend operation during the eighth or ninth month, while others defer it to the twelfth or thirteenth year. The Zurich Clinic prefers to wait, and most cases are operated upon from the seventh to the twelfth year. There are about 33 different procedures. The author mentions more particularly those of Schueller, Nikoladoni, Hahn, Katzenstein, Coujard, de Quervain, Mauclaire, and Anschuetz. The method of Ombrédanne, i.e., transscrotal orchidopexy, has been used nearly exclusively at the Clinic; it is based on the elasticity of the vaginal wall of the testicle. After mobilization of the testicle through an inguinal incision, a route into the scrotum is made by blunt dissection with a forceps; the scrotum is then opened on the opposite side, which discloses the scrotal vaginal wall; this is incised. The exposed testicle is pulled through this slit, the slit is caught round the testicle by a few sutures, and the skin is closed. This operation was performed 103 times in the 99 cases and was highly satisfactory. In the other cases, the use of other methods was imposed by the shortness of the seminal duct or of the vessels. The mortality was zero.

At control examination, the size of the testicle was determined according to the method of Reich. He has established the size of the normal testicle in 200 children. He found that that of a nursling differed very little from that of a ten-year-old boy. After this age the period of growth begins, and the greatest increase in volume takes place between the ages of fourteen and sixteen years. A table of sizes is given. According to this table the Clinic has obtained a very good result in 85.1 per cent of the cases and a satisfactory result in 9.5 per cent; the result was poor in 4 cases. The author compares these results with the statistics of Mache, Heinicke, Burkard, Hofstaetter, Grauhan, Brunzema, and Johner. The comparison shows that the Ombrédanne method, which has been used very little up till now in Germany, is not in any way inferior to the other methods and can be recommended because of its high percentage of correct positions and of postoperative growth of the testicle. Good results were shown even when the operation was performed during puberty.

(Franz). Richard Kemel, M.D.

Ormond, J. K., and Prince, C. L.: Malignant Tumors of the Testicle. *J. Urol.*, 1941, 45: 685.

Testicular tumors have been observed at all ages, but are commonly said to be most frequent between the ages of twenty and forty, the years of greatest sexual activity. The most common symptoms are swelling and pain, swelling being noticed twice as often as pain. Other symptoms reported are abdominal tumor, loss of weight, cough, hemoptysis, indigestion, nausea and vomiting, and enlargement of the left supraclavicular glands. These, of course, are due to the effects of metastases.

During the quiescent period of growth, the neoplasm is limited by the resistance of the tunica albuginea, and for a long time retains the shape of an enlarged testicle. Therefore, the shape is typically oval, though spherical tumors are seen. The surface is usually smooth, but as the tumor grows the tunica albuginea may become eroded and nodules form on the surface. The epididymis and cord remain unaffected for a long time, and the finding that the epididymis is flattened out on the posterior surface of the mass may be an important diagnostic point. The size varies greatly, from a tumor but little larger than the normal organ to one the size of a football.

Metastases from tumor of the testis occur chiefly by way of the normal lymphatic drainage of the testis, i.e., along the spermatic artery to the retroperitoneal nodes; then the spermatic epigastric, mediastinal, and supraclavicular glands may become affected.

In the differential diagnosis the following are always mentioned: (1) tumor arising from the structure surrounding the testis (which must be very rare); (2) syphilis; (3) tuberculosis; (4) hydrocele; (5) old hematocele; and (6) benign tumor.

There are two chief forms of tumor; the homogeneous, composed of cells of a single type; and the mixed tumor or teratoma. The pathology is in dispute, there being two schools among pathologists. One believes that all these tumors are teratomas or mixed tumors, arising from primitive cells which are totipotent and can therefore give rise to tumors composed of cells of any of the primitive germ layers. The other school believes that there are two main types of testicular tumors, the teratoma and what they call the seminoma, which they believe arise from the cells lining the seminiferous tubules. These appear in middle life, are relatively slow growing and solid, and when cut present a surface which is fleshy and homogeneous.

There are at present 5 methods of treatment: (1) orchidectomy alone; (2) deep x-ray therapy alone;

(3) orchidectomy followed by deep x-ray therapy; (4) orchidectomy with pre-operative and postoperative x-ray therapy; and (5) radical orchidectomy with removal of the draining lymphatics.

Deep x-ray therapy alone is rarely practiced except in obviously inoperable cases, and even in these the testis is usually removed for diagnosis. Orchidectomy followed by deep x-ray treatment, or both preceded and followed by it, are the methods advocated by most, and the two methods seem to have about an equal number of adherents. The qualitative and quantitative determination of prolan A is recommended as a differential diagnostic procedure before operation; as a means of determining the presence of metastases after removal of the tumor; and as a guide to the repeated use of x-ray therapy.

JOHN A. LOEF, M.D.

MISCELLANEOUS

White, E. C., and Hill, J. H.: Bacterial Urease. Critique of Methods Heretofore Used for Demonstrating Bacterial Urease and Presentation of Valid and More Sensitive Test. Study of Ureolytic Action of Bacteria of Significance in Genito-Urinary Infection. *J. Urol.*, 1941, 45: 744.

The ability of an organism to hydrolyze urea to ammonia and carbon dioxide is of interest from the standpoint of classification, and also has an obvious bearing on the possible etiological function of the organism when present in the urinary tract in cases of alkaline urinary lithiasis.

Published methods for the demonstration of bacterial urease are reviewed, and it is shown that all contain potential errors. A modification of the method of Wohlfeil and Wollenberg is presented by which a positive result rigidly indicates bacterial urease. A negative result means that there is insufficient urease available to produce as much as 0.002 mgm. of ammonia by the hydrolysis of urea, under the conditions of the test. The delicacy is greater than that obtainable by other methods for the demonstration or quantitative determination of ammonia.

The role of ureolytic bacteria in the decomposition of urine has been recognized since the time of Pasteur. The clinical significance of this type of bacterial enzyme action, especially in recurrent lithiasis, is receiving increasing recognition.

The ureolytic action of a number of bacteria has been studied by the authors with the following findings:

All urinary proteus and proteus morgani strains tested were strongly ureolytic.

A differentiation in ureolytic action was observed between strains of aerobacter and of escherichia: while all of the former were markedly ureolytic, less than half of the latter showed urea-splitting action and this amounted to only a trace.

Ten of 17 strains of pseudomonas aeruginosa were ureolytic.

Of 103 staphylococcus-micrococcus strains 70.8 per cent were ureolytic. This was in sharp contrast to both the streptococci, of which only 1 of 33 strains showed this action, and to the pneumococci, none of which was ureolytic.

Very little urea-splitting was observed in the strains of neisseria tested. JOHN A. LOEF, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS ETC.

Gruening, P.: The Distribution of Lesions of Muscles, Bones, and Joints Through Work with Compressed-Air Machines, with Special Reference to Their Localization. (Die Verteilung der "Erkrankungen der Muskeln, Knochen und Gelenke durch Arbeit mit Pressluftwerkzeugen" hinsichtlich ihrer Lokalisation). Muenster i. W.: Dissertation, 1940.

Compressed-air machines are portable work apparatus which use stored up energy in the form of compressed air to transform energy into work. The compressed-air hammer is used in the coal-mining industry to break through coal, and the air hammer in the iron industry is used as a rivet hammer. The action produced by the compressed air in the machine is made up of rapid vibrations which occur from 250 to 400 times a minute. The vibrations of the machine drive before it a tool which is either chisel-shaped and sharp or like a hammer and blunt. In coal mining the hammer is used to break down the coal and the chisel for boring the gunshot holes. In the iron industry the compressed air hammer is used for shaping the heads of rivets and closing seams, also for beveling and shaping sheet borders. In quarries and road-making its use is considerably less. There is a marked vibration of the body in addition to that of the holding arm which can after years of vibrations result in disease changes in the arms. An order was issued in 1929 which provided for compensation in occupational diseases and which recognized as occupational diseases the lesions of the muscles, bones, and joints caused by work with compressed air tools. "Angioneuromas" of the finger capillaries and a decrease in function of the peripheral nerves were not included. In addition to the joint changes in the arms, semilunar bone necrosis was also recognized as an occupational disease. Muscle injuries are rare.

This investigation includes the years from 1900 to 1938 when occupational diseases were recognized as the result of the use of compressed air machines in Prussia. Of 688 patients, the greatest number were from the coal-mining industry and only 7 from the iron industry. Seventy-seven per cent of the disabled were at their labor longer than ten years. The length of disability varied between two and twenty-nine years. The right elbow joint was involved the most frequently. That is natural, as the handle is held by the right arm and suffers the recoil while the left arm supports the tool only on the under side. Rostock believes the origin of the joint injury is from this recoil. The untrained or tired workman is more often disabled as the joint surfaces will be hammered toward each other in quick succession. This causes pressure necrosis of the cartilages, occlusion of the joint surfaces, and reactive joint proliferation. However, Beintker believes that in the iron industry the material is harder and the recoil is more forceful and for these reasons many joint injuries are certain to occur. But this is not the case. It is a fact that in the coal-mining the chiseling does not offer a solid resistance but more often drives ahead and the arm follows through which causes a tear of the joint capsule. Beintker understands the true condition.

Roentgenologically one finds ossification and calcium deposits in the capsule around the joints of the upper arms and there is a widening of the head of the radius and hypertrophic changes of the coronoid process of the ulna. Such changes exist and the guild will not recognize a claim for this disability of less than two years' duration. The bones of the hand which may become involved are either the semilunar bone or those making up the other joint. This condition is termed "Lunatummalacie." A less common site of injury is the shoulder joint which was involved in only 1.4 per cent of the cases. The shoulder joint is most distant from the source of the concussion and will therefore receive only a minimum impact. RICHARD J. BENNETT, JR., M.D.

Mascheroni, H. A., and Reussi, C.: Fluorin Osteosis (Osteosis fluorica). *Rev. med.-quirürg. de patol. femenina*, 1941, 9: 147.

Fluorin osteosis is a disease of the bones and teeth caused by the ingestion of excessive amounts of fluorin, usually in the drinking water. A survey was made of Argentina and a map is given showing the areas in which this disease is found. An analysis of the bones in the first of the cases published in that country showed 9.750 gm. per 1000 of fluorin in the bone ash. It has become a serious sanitary problem. In some of the regions investigated there was as much as 2 mgm. per liter of fluorin in the water and the drinking of this water in childhood causes serious injury of the teeth and bones.

Three cases are described and illustrated with roentgenograms and photomicrographs. The first was in a young woman of twenty-three years in whom the bone lesions were unusually severe, probably because of the fact that there was an unusual accumulation of fluorin in the tissues. She had poor kidney function which was due to congenital extrophy of the bladder and ureterohydronephrosis. The second was in a woman of forty-two years, and the third in a woman of twenty-eight years. In all the cases a study was made of the family and of the neighborhood to see whether there were other cases. The water supply of the neighborhood was investigated to see whether the fluorin content was too high. All of the patients showed changes in the teeth, respiratory changes with decreased vital capacity, changes in the blood consisting of a slight normocytic and

normochromic regenerative anemia, and in one of the cases a leucemoid reaction. They also had headaches, a slight increase of calcium in the blood, and bone changes consisting of pain, kyphosis, decreased excursion of the chest wall, hyperproduction of bone with exostoses, increased density of the bones and osteoporosis, thickening of the cortex, disappearance of the trabeculæ, and zones of reabsorption of bone with increased fluorin content of the bones.

AUDREY G. MORGAN, M.D.

Korniev, P. G.: The Role of Orthopedic Measures in the Treatment of Articular Tuberculosis. *Vestnik khir.*, 1940, 60: 405.

A proper treatment of osseo-articular tuberculosis consists of a combination of orthopedic measures and general therapy.

Methods activating the specific process by hyperemia did not yield good results and should be replaced by immobilization of the involved extremity. Plaster-of-Paris casts and extension supplement each other. The functional result depends not so much on the methods employed as on the character of the destructive process. On one hand, a cast does not guarantee the formation of ankylosis and, on the other, continuous extension and limited motions are not always able to preserve the mobility of the involved articulation.

Extension is most useful in recent, incipient cases of coxitis or gonitis, correcting myogenic contractures and replacing immobilization while a change of the casts is being made.

During the period of acute pains and development of complications, a circular cast should be applied. In other stages plaster-of-Paris splints are preferable because they do not interfere with physical therapeutic and surgical measures. Fenestrated circular casts are recommended if an aspiration of the pus is contemplated.

JOSEPH K. NARAT, M.D.

Colombani, S.: The Frequency of Complications of the Urinary System in Patients with Osteo-Articular Tuberculosis (Sulla frequenza delle complicazioni dell' apparato urinario negli ammalati di tubercolosi osteo-articolare). *Chir. d. organi di movimento*, 1940, 26: 175.

Colombani found that of a total of 1,328 patients having osteo-articular tuberculosis, observed from 1923 to 1939 at the Heliotherapeutic Institute of Codivilla, 224, or 16.87 per cent, had a disease of the urinary system. Among these, 71, or 31.69 per cent (5.35 per cent of all the cases), had renal tuberculosis; 59, or 26.34 per cent (4.44 per cent of all the cases), had degenerative renal disease; 12, or 5.36 per cent (0.90 per cent of all the cases), had symptoms suggesting renal tuberculosis which, however, could not be diagnosed; 24, or 10.72 per cent (1.80 per cent of all the cases), had disorders of the urinary system of long standing which did not allow the diagnosis of tuberculosis of the kidney or of some other part of the system, but suggested it; 58, or 25.89 per cent (4.37 per cent of all the cases), had temporary disorders of the kidneys or of the urinary passages.

In a patient with osteo-articular tuberculosis, any disease of the urinary system which has persisted for a long time and is refractory to medical and dietary treatment aggravates the prognosis notably and raises the suspicion of renal tuberculosis. The statistics of the Institute show a mortality of 3.01 per cent for renal tuberculosis in subjects having osteo-articular tuberculosis. If the aggravated (0.90 per cent) and the stationary (0.37 per cent) cases were taken into account, this percentage would increase to 4.28. Renal tuberculosis may occur in any stage of the disease of the bone when the general or local defense powers are decreased, and it always makes the prognosis unfavorable if timely surgical treatment is not instituted. Often surgical treatment is made impossible by the serious general condition of the patient or by the bilaterality of the renal lesion. Renal tuberculosis generally attacks those who are already debilitated, but its occurrence is not due to the gravity of the osseous disease; in 90.14 per cent of the cases, it appeared after the beginning of the osteo-articular lesion.

A decided predominance of the male sex, and of lumbar spondylitis has been noted among the patients who have diseases of the urinary system with osteo-articular tuberculosis, and most frequently these patients are in the third decade of life. The renal degenerative diseases (nephrosis, amyloidosis) have always been found in patients suffering from long-standing suppurative processes, and their presence greatly aggravates the prognosis because they are an expression of the gravity of the general condition of the patient. The mortality of these patients amounts to 2.10 per cent; and the percentage of the aggravated (0.83) and of the stationary (0.15) cases, of which the prognosis is always unfavorable, would increase the mortality to 3.08 per cent. The nephrosis nearly always continues its course even if the bone disease heals.

Of the 224 patients with disease of the urinary system, 76, or 5.73 per cent, have died; in 29, or 2.18 per cent, the condition is aggravated; in 13, or 0.98 per cent, it has remained stationary; in 37, or 2.78 per cent, it has improved; in 11, or 0.83 per cent, it is cured, and in 58, or 4.37 per cent, there seem to have been only temporary disorders which, in general, have not interfered with the course of the osteo-articular disease. The aggravated and the stationary conditions of patients who have a disease of the urinary system have always led to an unfavorable prognosis.

There seems to be little probability that a tuberculous process can spread by contiguity from the psoas abscess to the kidney. In every patient with osteo-articular tuberculosis, it is necessary to make a systematic examination of the urinary system, because this investigation has the same importance as that of the respiratory system. Cultural and biological study of the urinary sediment is indicated in every case in which pathological elements are present

in the urine and in which even the slightest disturbance is found in the renal function. Only by such studies will it be possible to diagnose and cure renal tuberculosis. RICHARD KEMEL, M.D.

Belgrano, V.: Experimental Research on the Osteogenesis by the Vesical Mucosa in the Repair of Bones (Ricerche sperimentali sull' osteogenesi da mucosa vescicale nelle riparazioni dello scheletro). *Policlin.*, Rome, 1941, 48: sez. chir. 89.

A review of the literature shows that the conclusions of the various authors still disagree on the osteogenetic property of the epithelium of the organs of the urinary tract: some accept as very frequent the formation of bone tissue following transplantation of the mucosa of the bladder, while others, without completely denying this possibility, claim that it is rather inconstant. This disagreement is due to the animal used for the experiments or to the tissue or organ in which the graft has been inserted: rabbits have given a large number of negative results, while dogs have, in general, given positive results; insertion of grafts of the vesical mucosa into muscular tissue, the spleen, or gaps in the bone has given positive results, which were particularly constant in the muscular tissue.

Belgrano conducted his experiments on 16 dogs, using 3 animals as controls. Through a subumbilical median laparotomy, he exteriorized the bladder and resected from its roof a small lozenge, the size of a quarter and involving the entire thickness of the wall of the organ; he placed the specimen in a sterile physiological salt solution with a temperature of 37° C. and sutured the bladder. Then he exposed the middle third of the tibia, elevated the periosteum, made a trephine opening in the bone, and enlarged the opening by means of a bone resecting forceps; he scooped out the marrow and, after having carefully removed the mucosa only from the bladder specimen, deposited it into the cavity and closed the wound.

The results were not as good as those obtained by some other authors. The small number of positive results is to be attributed to the facility with which suppuration occurs in the wound and to consequent elimination of the graft as a foreign body. The changes which took place in the transplanted tissue and in its vicinity were followed up for a period varying between twenty-two and sixty-six days. In 3 cases in which there had been no suppuration of the focus of insertion of the graft, histological examination twenty-two, thirty-five, and sixty-six days, respectively, after the operation showed no trace of the bladder epithelium but strong proliferation of the connective tissue. In 4 cases, histological examination twenty-four, thirty-three, forty-four, and fifty-nine days, respectively, after the intervention revealed the presence of epithelial cells in various stages of regression and modification. In 2 of these cases, it was possible to observe the final evolution of the graft, or rather of the connective tissue which had replaced it. The young connective-tissue elements were surrounded by an amorphous substance and assumed peculiar staining properties. The nuclei became larger and less numerous and presented darker, thin fibrils which radiated toward the periphery and assumed an irregularly stellate form. The histological aspect of these cells was thus morphologically rather similar to that of bone tissue. No cystic cavities were observed during the process of osseous metaplasia. The histological findings were in part confirmed by roentgen examination which showed more rapid repair of the bone lesion in the animals in which the graft had been inserted than in the controls.

The author draws the following conclusions from his experiments:

1. Following a homologous graft of vesical epithelium into the medullary canal of a long bone in the dog, there is a new formation of connective tissue which surrounds the graft and replaces it.
2. In rare cases, there is a metaplasia of the connective tissue into bone tissue.
3. This process is not constant, because the connective tissue in most cases changes into fibrous tissue. RICHARD KEMEL, M.D.

Liberti, V.: Segmental Bone Regeneration with Heteroplastic Grafts (Rigenerazione segmentaria ossea mediante innesti eteroplastici). *Ann. ital. di chir.*, 1940, 19: 389.

Liberti prepared his heteroplastic grafts from the spongy portion of bones of oxen (vertebral body, lower extremity of the femur) after prolonged boiling and subsequent drying in the open air. The grafts, 2 cm. long, were cut to the thickness of the tibia of rabbits and their extremities were further reduced to allow them to fit into the medullary canal of this tibia. With the intention of creating conditions favorable to the taking of the grafts, he saturated them with physiological salt solution, homogenous citrated blood, 2 per cent oily solution of cholesterol or this cholesterol solution mixed with homogenous blood. He excised portions of the tibias of rabbits, preserving as much as possible the periosteum and the fibula, and installed the grafts which he then covered with the remnants of periosteum. The legs of the animals were immobilized in plaster casts and the animals were kept under observation for two months.

The grafts treated with physiological salt solution or with blood of the hosts gave unfavorable results, at least for the time during which the observation lasted: they were found to be softened and decayed, and the parosteal tissues showed no reactions which would be sufficient, from the osteogenetic point of view, to lead to replacement of the graft and to repair of the missing portion of the tibia. On the other hand, the grafts treated with cholesterol solution alone or mixed with homogenous blood gave satisfactory results: macroscopically, there was solid continuity of the tibia and, histologically, the trabecules of the spongy graft were gradually resorbed and replaced by the formation of a special

parosteal and periosteal osteogenetic tissue rich in osteoclasts. Complete replacement of the graft and complete ossification of the reactive tissue were not observed because the period of survival of the animals was not long enough to allow termination of the process. In fact, other authors who have studied the question state that completion of the process takes several months and even years; in the present experiments, it was impossible to keep such weak animals as rabbits in a plaster cast, no matter how light, for more than two months. It is impossible to state what part cholesterol plays in the mechanism of the reactive and regressive processes. Authors who have introduced cholesterol directly into the focus of a fracture and have obtained more rapid formation and greater strength of the bony callus attribute to the substance a special property which manifests itself by greater deposition and fixation of calcium. Liberti thinks that, in addition, cholesterol possesses a marked stimulating power on all the osteogenetic reactive processes which result in the substitution of the graft by new bone. The homogenous blood is of no special help in this process as it has remained without appreciable action when used alone. RICHARD KEMEL, M.D.

Jacobson, S. A.: Critique on the Interrelationships of the Osteogenic Tumors. *Am. J. Cancer*, 1940, 40: 375.

The author presents a comprehensive review and study of the interrelationship of tumors of the skeletal tissues and places it on a simple logical basis.

The scheme of the classification developed by the writer is shown below.

A detailed discussion of the literature on the various types of skeletal tumors follows, and is accompanied by the author's comments and conclusions pertaining to the phylogenesis of these lesions.

DANIEL H. LEVINTHAL, M.D.

Bosworth, B. M.: Calcium Deposits in the Shoulder and Subacromial Bursitis; A Survey of 12,122 Shoulders. *J. Am. M. Ass.*, 1941, 116: 2477.

Six thousand and sixty-one unselected persons were subjected to physical and fluoroscopic examination of both shoulders. Of the whole group, 165 (2.7 per cent) were found to have calcium in sufficient amount to show up on fluoroscopy in one or both shoulders. The incidence of calcium formation was exactly the same in the employee and the non-employee groups.

Multiple deposits occurred in 20.3 per cent of the involved shoulders. Calcium appeared subsequent to negative fluoroscopic examination in 29 (14.4 per cent) of the 202 shoulders showing deposits. Although calcium has often been observed to regress, with or without treatment, it entirely disappeared in only 13 shoulders. Nine of the 13 presented symptoms. In 2 no treatment of any kind was given and in 2 others the deposit was removed surgically. In 5 the deposit disappeared coincidentally with baking or diathermy. In the remaining 4 in which the calcium disappeared, there were never any symptoms nor was any treatment given.

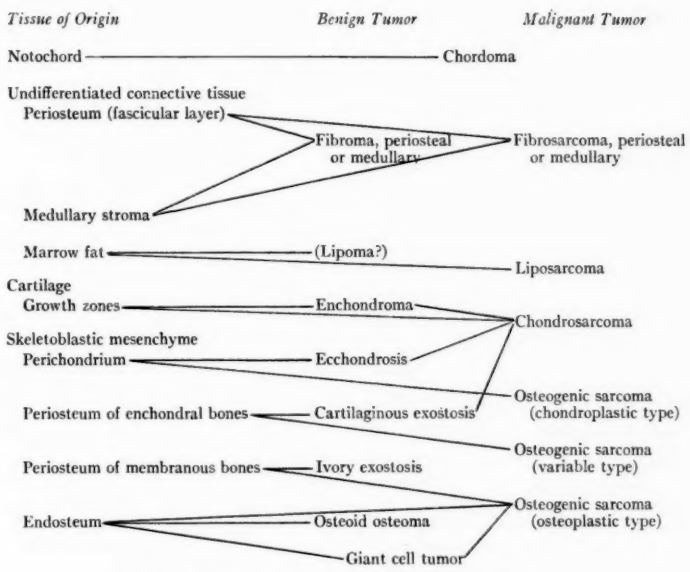

Fig. 1. Tumors of Undifferentiated Connective Tissue.

Seventy (34.6 per cent) of the involved shoulders caused some degree of pain either prior to or during the period of observation; 22 (10.9 per cent) gave rise to symptoms for the first time subsequent to the discovery of the calcium on fluoroscopic examination. The size of the deposit in general was in proportion with the symptoms complained of, yet one-third of the large deposits gave rise to no complaints whatever while under observation.

This condition is sometimes self limited and self curative. As many as from 60 to 80 diathermy treatments were given to a single shoulder over a period of from six to eight months, and in at least 2 instances, with little or no relief. Frequently an acute attack was precipitated or a somewhat painful shoulder made worse by the application of heat. The author believes that the best treatment for the acute attack is prompt excision of the deposit under local or general anesthesia through a small incision. It is said to give immediate, certain, and complete relief. The average hospital stay was four days, and regular duties were resumed in three weeks. Immobilization of the shoulder is mentioned only to be condemned because of danger of the formation of adhesions. Large deposits should be excised, regardless of symptoms, to forestall the development of an acute attack of bursitis. Medium and tiny deposits should in general be treated conservatively and should be watched. Calcium deposits occur most commonly among males. Serious illness, arthritis, rheumatism, and infection, whether local or systemic, past or present, are said to exert no influence on the formation or regression of the deposits. Occupations which require constant prolonged abduction of the arms are said to promote the formation of the calcium deposits in the shoulder.

RICHARD J. BENNETT, JR., M.D.

Holmberg, L.: Septic Spondylitis. A Report of 7 Cases. *Acta chirurg. Scand.*, 1941, 84: 479.

Holmberg describes 7 cases of septic spondylitis, 5 caused by staphylococci, 1 by streptococci, and 1 of probable influenzal origin. The pathogenesis is discussed, as well as the relation to trauma. The author believes that trauma is not of etiological significance.

Septic spondylitis is a rare disease with a high mortality and morbidity, caused by the same organisms responsible for osteomyelitis elsewhere, affecting men more frequently than women, and involving the thoracic and lumbar segments of the spine.

In 4 of the cases reported the vertebral bodies in the same region were affected, in 1 case vertebral bodies in several areas, and in 2 cases arches and vertebral bodies in different areas were involved. Abscesses occurred in 6 of the 7 cases. The roentgen rays are of value in early cases as they demonstrate abscess shadows and edema. Differential diagnosis must be made chiefly from tuberculous spondylitis. Treatment consists of early incision and drainage followed by immobilization. J. M. MORA, M.D.

Delitala F.: Function in Ankylosis of The Hip Joint (Deambulazione ed anchilosi dell'anca). *Chir. d. organi di movimento*, 1940, 26: 5.

The author studied the hip joint with x-rays and motion picture films. In normal motion with integrity of the joint there is a flexion-extension movement of 25 degrees, while in ankylosis of the hip joint there is a compensatory oscillation of the pelvis of 25 degrees about two axes, one in a frontal plane through the lumbosacral articulation, and the other through the well joint. The muscles which move the pelvis are the abdominal muscles, the lumbosacral, and the flexors and extensors of the healthy hip joint. The well hip is thus subject to extra work. When there is a flexion ankylosis of the hip joint there is a downward tilt of the pelvis. The author proposes the use of the Roser-Nelaton line as a standard. A favorable position of ankylosis would be a 50-degree angle with the Roser-Nelaton line. A greater angle would be good for standing but would not be effective in walking. Ankylosis in adduction, abduction, and internal and external rotation is unfavorable and should be corrected. JACOB E. KLEIN, M.D.

Gui, L.: Anatomical Study in a Case of Pseudarthrosis of the Femoral Neck Cured by Intertrochanteric Osteotomy (Studio anatomico in un caso di pseudoartrosi del collo femorale curato con l'osteotomia intertrocanterica). *Chir. d. organi di movimento*, 1940, 26: 137.

Gui discusses the histological observations made in a case of pseudarthrosis of the femoral neck and shows that the callus of metaphyseal origin progressed upward until it reached and passed through the line of fracture. The abundant formation of this callus was astonishing in a woman aged seventy-three years. In the portion which unites the diaphysis to the trochanteric fragment as well as at the site where it passes through the line of fracture, the callus was composed nearly exclusively of osteoid and osseous tissue with only rare traces of cartilaginous callus, which, however, was rather abundant at the line of pseudarthrosis and especially in its upper part. The anatomical findings were of great interest because they showed that the upper extremity of the femur possesses great capacity for repair even in old people and under very unfavorable conditions (prolonged immobilization before the intervention). Lack of consolidation does not mean that all capacity for local repair is exhausted: in many cases, it is only held back by the complex of local conditions created by the fracture itself and aggravated by non-union of the fragments. The difficulty is to wake up the repair powers which the bone still possesses; this should be done with treatment that is not given up too soon. On the other hand, it is necessary to avoid the opposite pitfall of treating the pseudarthrosis as a recent fracture.

The thorough knowledge of all the phenomena which accompany fracture of the femoral neck and of the anatomical changes present in an old fracture has led to the intertrochanteric osteotomy of Putti,

which, to the eye of the casual observer, may seem to be related to that of Lorenz-Hass, but has really little in common with it. According to the German authors, the osteotomized diaphysis has the simple duty of supporting the epiphysis: consolidation between the diaphysis and epiphysis and, much less, the healing of the fracture are not expected from the intervention. In fact, Hass performs his osteotomy in non-reduced fractures with practically regular interposition of the capsule. This is never the case in intertrochanteric osteotomy. Putti's operation is not a palliative intervention to be used in cases in which there is nothing better to do; it is a reconstructive operation based on the principles of treatment of retarded consolidation: strict immobilization of the focus of fracture obtained by a change in architecture of the upper portion of the femur, supply of bone forming material, and opening of the marrow spaces of the metaphysis which is brought in contact with or in the vicinity of the line of pseudarthrosis.

RICHARD KEMEL, M.D.

DeFine Licht, E.: Bipartite Os Naviculare Pedis. *Acta radiol.*, 1941, 22: 377.

The term bipartite os naviculare pedis is used to describe a lesion diagnosed only roentgenologically. A dorsoplantar view reveals a wedge-shaped alteration of the bone, with the base of the wedge directed medially. Lateral to the point of the wedge is a triangular shadow which is located dorsally and appears in the lateral view to be separated from the remainder of the navicular bone. The lesion may be unilateral or bilateral and is probably of congenital origin. It must be differentiated from tabes dorsalis and fracture. Pain on standing and limitation of motion are to be expected symptomatically.

The author reports 4 cases, all of which also showed arthrotic changes in the affected joints. He could find only 7 other cases previously reported, all in the literature of continental Europe.

CHESTER C. GUY, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Farill, J.: Arthrodesis in Tuberculous Coxitis (El tratamiento artrodesiante en la coxitis tuberculosa). *Gac. méd. de México*, 1941, 71: 172.

Arthrodeses were performed on 31 cases of tuberculous coxitis, the operation being done twice in 1 case. Eight were intra-articular operations and the remainder were periarticular, 3 by the method of Sorrel, 2 by that of Hass, 1 by that of Ghormley, and 18 cases by that of Farill himself.

In marked cases of deformity an arthroclasia or a subtrochanteric osteotomy preceded or followed the arthrodesis. Conservative methods were invariably tried first, until the inflammatory process became quiescent. The inflammation often disappeared after prolonged rest in bed (from two months to two years) and, in case of pains and muscular spasm, following traction with a weight. The affected limb was then placed in a plaster-of-Paris cast, fixed in a position of slight flexion and slight abduction. From three to four weeks later, an arthrodesis was performed through an elliptical space cut in the plaster cast over the trochanteric region. The plaster cast was removed two months after the operation and the patient allowed to take the first steps. In the author's method, a prismatic bone peg, dissected from the tibia, was implanted in a tunnel drilled from the subtrochanteric fossa to the base of the acetabular cavity, at the union point with the iliac wings.

Farill claims the following advantages:

1. Utilization of a bone peg taken at a distance from the tuberculous focus and therefore certainly immune from the disease.

2. The best mechanical conditions for the bone peg: implantation in the trabecular system running from the base of the great trochanter to the head of the femur.

3. Ample contact between the implanted bone and the femur-iliac tunnel.

4. Simplicity and rapidity of execution, without hemorrhage and surgical shock.

5. Prevention of any fracture or dislocation of the implanted bone, because the operation is performed without removal of the plaster cast.

As for the results, of 18 patients operated upon by Farill's method, only 14 were followed up for more than one year. One patient died of amyloidosis twenty-five months later. In 12 cases a bony ankylosis was obtained (50 per cent intra-articular, 50 per cent periarticular): in 1 case only, a fibrous ankylosis followed. There was no operative mortality and no postoperative complications developed.

Fracture, dislocation or total reabsorption of the transplanted bone, or a secondary pseudarthrosis were registered in contrast to the results of other operative methods. EMANUELE MOMIGLIANO, M.D.

Horeyseck, L.: Results of Curved Resection After the Method of Helferich for Tuberculosis of the Knee Joint of the Adult (Ergebnisse der bogenfoermigen Resektion nach Helferich bei der Kniegelenkstuberkulose Erwachsener). *Ztschr. f. Orthop.*, 1941, 71: 317.

Horeyseck believes that necrosis can be eliminated in the treatment of joint tuberculosis. The conservative procedure which is the method of choice in children is of value also for adults when local and general treatment are possible under the most suitable conditions and if "discharge, fixation, nutrition, medication, puncturing and injection combine to give a satisfactory result." This seldom occurs. Early operation is therefore indicated in cases when they are not treated for tubercular hydrops, and in adults over fifteen years of age it gives excellent results and does away with long protracted conservative treatment and suffering. Among 25 patients with tuberculous inflammation of the knee joint there was a total of one hundred and forty-six years of conservative therapy without satisfactory results.

On the other hand, results are reported for 25 patients in which resection was done by Horeyseck. The operative procedure was accomplished by means of a curved resection as described by Kummer and Helferich. The operative technique is briefly described. In 3 cases there was a fixation of the resection by means of a single nail being driven obliquely downward into the head of the tibia. Twenty-two of the patients had satisfactory follow-ups and 3 replied to questionnaires. The treatment previous to operation varied between five months and fourteen years and the ages of the patients operated upon varied from fifteen to forty-seven years. Healing followed primarily in 17 cases and was complete in from thirty-two days to seven months. Four patients showed pathology for more than 100 days and 21 for less than 100 days; of the latter 8 had symptoms for less than 50 days. The final results were excellent in all 25 cases and presented complete solidity in the most favorable positions: there were no subsequent abscesses, fistulas, or breaking down of the scars. In 2 cases there were small sequestra with occasional crepitation. It was necessary to raise the sole of the shoe in only 2 patients: all of the others used their ordinary shoes. Twenty-one were entirely relieved and regarded their illness as completely cured. Of the 9 male patients, 7 practiced professions and 1 is an invalid with tuberculosis of the lung. Of the 16 females, 14 were housekeepers and 2 worked as seamstresses. The operations have been completed for periods varying from five months to fourteen years. RICHARD J. BENNETT, JR., M.D.

FRACTURES AND DISLOCATIONS

Ahlberg, A.: The Treatment of Habitual Dislocations of the Shoulder Joint (Zur Behandlung der habituellen Schultergelenksverrenkung). *Acta chirurg. Scand.*, 1941, 84: 557.

In the question of treatment of habitual dislocations of the shoulder joint the uniform opinion appears to be that only the surgical interventions give permanent satisfactory results. However, the views as to the choice of the surgical method differ considerably. Up to the present time no method fully satisfactory in every respect seems to have been proposed, and if the cases operated upon are observed for a sufficiently long time, recurrent dislocations will be found after every operative method.

The author has adopted a modification of the Wahl technique. This technique is as follows: An Ollier incision is made. The musculature is divided bluntly at the anterior border of the deltoid muscle, and with a slight inward rotation of the humerus the intertubercular sulcus with the biceps tendon enters the operative field. The tendon sheath is slit up to the edge of the capsule and divided immediately under the greater tuberosity. A silk thread is drawn through each of the divided tendon ends, which facilitates their handling. Then with moderate muscle tension the distal end of the tendon is fastened in the intertubercular sulcus under a smal. fragment of bone and periosteum. The proximal end of the tendon is then turned over the inner border of the sulcus and fastened under a fragment of bone-periosteum in the lesser tuberosity, a perforation of the tendon of the subscapular muscle being made at the same time. As a result the arm is in a position of right-angled abduction. The bone fragment is 1 cm. broad and 1.5 cm. long, with a medial opening. The arm is fixed for about three weeks on an abduction splint. When the splint is removed, the arm is immediately freely moveable, and after a short physical after-treatment full mobility results.

The author reports on 4 cases in which this technique was followed. With this method the tendon of the long head of the biceps muscle serves as a suspension band of the head of the humerus. In 1 case the operation was done six months previously, and in the others two and one-half and four years previously, without a recurrence of the dislocation in spite of heavy demands on the arm. The mobility of the shoulder joint was normal after the operation in all of the cases; the patients suffered only slight subjective symptoms and were all satisfied with the result of the operation. LOUIS NEUWELT, M.D.

Bader, L.: A Clinicostatistical Study on Fracture of the Clavicle (Studio clinico-statistico sulle fratture di clavicola). *Chir. d. organi di movimento*, 1940, 26: 14.

In a series of 10,700 fractures at the Cook County Hospital, Speed reported 538 clavicular fractures, or an incidence of 5 per cent. The author reports on a series of 453 cases. As concerns age, the author's patients ranged from five to eighty years. Of these 140, or 39.9 per cent, were between ten and twenty-five years of age. Seventy-three per cent were males and 27 per cent were females.

The fracture may occur from direct, indirect, or muscular action. The most common cause is indirect action. The fracture occurred in the proximal third near the sternoclavicular articulation in 3.9 per cent of the cases. Two-thirds of all clavicular fractures involve the middle third of the bone. In the author's series there were 311 cases of this type, or 68.6 per cent. Fracture of the distal third occurred in 91.

The author describes the common roentgenological and clinical findings. He notes that fracture of the distal third of the bone may be confused with acromioclavicular luxation. Among the complications may be considered compound fracture; pleuropulmonary lesions such as pleurisy, empyema, pulmonary abscess; vascular lesions such as injury to the subclavian vessels, the carotid, or the internal jugular vein; and nerve lesions such as injury to the brachial plexus or spinal nerve roots. The author cites 4 cases with nerve injuries. He mentions an instance of a twenty-nine-year-old youth who sustained a fracture of the left clavicle in an automobile accident. There was complete paralysis of the brachial plexus eight days later. Six years later the paralysis was still present and surgical intervention was hopeless.

There may be other fractures associated with the clavicular fracture due to the original injury. There may also be late complications such as pseudarthrosis, secondary vascular and nervous changes, pains, and excessive callus with deformity.

The author notes that 150 diverse methods of treatment have been suggested. He used transskeletal traction according to Putti in 88 cases. Open reduction was required in 13 cases. In 3 cases surgery was required because of complications involving the nervous system. JACOB E. KLEIN, M.D.

Heim, H.: Why and How Should a False Joint of the Carpal Scaphoid Be Operated Upon? (Warum und wie muessen Kahnbeinfehlgelenke operiert werden?) *Chirurg*, 1941, 13: 13.

A false joint of the carpal scaphoid should be operated upon because it is asserted that pathological anatomy has not been sufficiently taken into consideration in the therapy of this condition. This is borne out by the failures of conservative therapeutic methods, including Beck's drilling. In the Naval Hospital at Kiel-Wik, fractures of the carpal scaphoid are most frequent· 250 cases were observed in four years, including 45 false joints which had been immobilized without primary improvement for months and even for a year.

Surgical intervention is indicated in all cases of improper joint formation, when discomforts recur, or when the ability to work is curtailed.

Formerly, it was the wrong practice to remove the entire carpal scaphoid, which destroyed the functional unity of the wrist joint. The proximal convex joint surface of the scaphoid forms a unified joint head with the semilunar and triangular bones for the joint surface of the os radiale, while the distal convex joint surface forms the second joint head of the double headed intercarpal joint. Since, generally, only this fragment is displaced, the removal of the latter is sufficient, particularly since it is unimportant functionally. Most frequently the wrist joint is opened from the dorsal side according to Langenbeck's method; this is followed by a circular plaster cast for two or three weeks and postoperative functional therapy which is gradually increased, without hot air or massage. The total duration of the treatment lasts approximately from four to six weeks.

In exceptional cases, when the false joint is situated in the proximal portion of the carpal scaphoid, the proximal fragment is usually very small. In such cases only the latter should be removed and not the large fragment, so that functional unity may be preserved. (WERNER BLOCK). HILDA H. WHEELER.

Canigiani, T.: Increasing Frequency of Fractures of Spinal Processes in Shovel Workers—So-Called Shovel Workers' Disease (Gehaeuftes Auftreten von Dornfortsatzbruechen bei Erdarbeitern, Sogenannte Schipperkrankheit.) *Wien. klin. Wchnschr.*, 1940, 2: 982.

A few months after the home-coming of the Ostmark to the Reich, coinciding with the economic boom in former Austria, not less than 50 cases of typical "shovel worker's disease" could be established by the author, about 10 times the number of fractures of the spinal processes demonstrated with roentgen rays in former years. In the ensuing months and years these avulsion fractures gradually occurred less frequently, and today the average of former years has been reached as far as the number of cases is concerned.

An exact diagnosis can be made only by means of roentgen-ray examination. The complaints are well known. As to the mechanism producing this form of fracture we are dealing with an injury that is caused by the pull of the rhomboid and trapezius muscles which become unusually strongly contracted during the action of shoveling or scooping. Unilateral muscle contraction only is always responsible (left-hand and right-hand workers). There is a unilateral pull on the spinal processes. The somewhat larger spinal process of the seventh cervical vertebra is particularly endangered. The injury occurred in persons of poor physical condition who were not accustomed to labor (after long unemployment), or in those who had never before done any hard physical labor. It is emphasized that the so-called "shovel worker's disease" is not only one of the bone but probably also one of the muscle, because one link of the kinetic chain involves the other links.

In the beginning, treatment of these cases consists of fixation. Subsequently, active exercises should be performed, but no fixation should be used later on. The fracture of the spinal processes is an absolutely harmless injury which heals more quickly if treated less. Therefore, the injured person should not be told too much about his injury, because the knowledge of these details results only too often in an invalidism neurosis. Healing often occurs without bony union of the fragments. The pseudarthrosis which results usually causes no functional disturbance. (BODE). JEROME G. FINDER, M.D.

Carrell, B., and Carrell, W. B.: Fractures in the Neck of the Femur in Children, with Particular Reference to Aseptic Necrosis. *J. Bone & Joint Surg.*, 1941, 23: 225.

Fractures of the femoral neck in children frequently result in permanent disability. The characteristic site is at the cervicotrochanteric junction, and the most common cause is severe trauma received by falling from high elevations. Satisfactory reduction has been more difficult to secure and retain in children by the commonly employed methods of treatment than in adults. The incidence of aseptic necrosis in children is probably higher than in fractures of the neck of the femur in adults.

From this study of 12 such fractures in 10 children, the authors conclude that reduction with application of the Whitman adductor plaster is inadequate; nailing is undesirable; and traction alone does not correct the deformity. Traction and adduction combined, not only reduce the fracture accurately, but maintain the reduction satisfactorily.

The location of the fracture in the cervicotrochanteric region is a favorable site for circulatory damage and aseptic necrosis. A summary of this group of cases with regard to location of the fracture shows 8 of the cervicotrochanteric type and 4 of the midcervical type. Each of the latter 4 cases had some complicating factor relating to the injury. The authors believe that the type of fracture is cervicotrochanteric in 75 per cent of the cases, and also that skeletal fixation in plaster may be substituted for traction; in delayed reduction, adductor tenotomy may be necessary; in cases seen later in coxa vara (after four weeks) union should be permitted and then the deformity should be corrected by osteotomy; otherwise aseptic necrosis may supervene. To decrease the damage from aseptic necrosis, a little period without weight-bearing should be advised.

Results of the various methods employed for reduction and maintenance are noted. A résumé of the 10 cases with 12 fractures of the femur is given. Several illustrations of roentgenograms are reproduced. Reports in the literature should substantiate the conclusion that cervicotrochanteric fractures in children are not satisfactorily reduced and maintained in reduction by the method which has been usually employed in the treatment of fractures in adults.

EMIL C. ROBITSHEK, M.D.

Logròscino, D.: Fractures of the Tibial Spine in Skiers (Le fratture della spina tibiale negli sciatori). *Chir. d. organi di movimento*, 1940, 26: 115.

Fracture of the tibial spine in skiers does not differ from that due to other types of trauma, except for its greater frequency and the mechanism which causes it. It occurs especially in unstable knees which have suffered a previous trauma with a probable lesion of the medial collateral ligament. The skier presents particularly favorable conditions for the production of this fracture because of the great leverage of the ski. If stopping, which is done at great speed by a rapid change in direction, is badly executed, the result may be simple tearing of the medial collateral ligament or fracture of the tibial spine. In many cases, the accident is due to a fall while gliding downhill: in this position, the legs are in semiflexion of from 40 to 60 degrees, and in internal rotation of about 30 degrees, with a slight lateral inclination. The medial collateral and the anterior cruciate ligaments are therefore in strong tension. If the skier falls forward and to the outside, the medial ligament may snap and the tibial spine break. This is what occurred in 4 of the 5 cases which Logròscino reports; in the fifth case, the skier ran into a tree while having his leg strongly flexed on the thigh.

The physical diagnosis of fracture of the tibial spine is presumptive because there is no absolutely sure symptom for this lesion. The roentgenogram is needed to confirm the diagnosis; it may reveal a fracture that was not even suspected. The history is important: it may show that the knee was in a favorable position for fracture at the moment of the accident. If the patient, on trying to get up, had rather severe pain and found his knee unserviceable, something more than a simple tearing of the ligament should be suspected, because the latter does not cause such severe symptoms. Effusion in the joint appears in from twenty to sixty minutes. Limitation of extension of the knee is a fairly probable sign of the fracture: in 4 of the present cases there was irreducible semiflexion of the knee, associated with valgus in 1 case. The whole joint is painful. A peculiarity of the strongly hemorrhagic effusion is that its surface presents small spots of fatty fluid which suggest something more than simple tearing of a ligament.

The treatment is conservative and should be applied early to insure good results. Under local anesthesia of the soft tissues, the joint is emptied by puncture and 15 c.cm. of a 2 per cent novocaine solution are introduced. The faulty position of the leg is corrected by manipulation and traction and the knee is immobilized in moderate extension by means of a plaster cast reaching from the top of the thigh to the toes. Walking and weight-bearing are allowed after two weeks. In severe cases requiring careful supervision for the first days, a posterior plaster splint and an icebag on the knee are used, and the full plaster cast is applied after from seven to ten days. According to the cases, the cast is cut in halves from the thirtieth to the forty-fifth day, and careful mobilization is started. Thermotherapy is used until complete functional recovery; from 20 to 30 sittings are needed. In inveterate or neglected cases, surgical treatment may become necessary.

RICHARD KEMEL, M.D.

ORTHOPEDICS IN GENERAL

Gallie, W. E.: The Experience of the Canadian Army and Pensions Board with Amputations of the Lower Extremity. *Ann. Surg*, 1941, 113: 925.

This report deals with conclusions based on the experience with 2,448 amputations of the lower extremity over a period of twenty-five years. Four types of amputations are discussed, all others being unsatisfactory.

Syme's amputation when properly done is the best of all. There must be no redundancy of the heel flap and it must be firmly secured by adhesive or plaster for two or three weeks postoperatively. It cannot be done on the battlefield or where there is risk of infection or when the viability of the flap is questionable. Many painful and poor Syme's stumps can be refashioned satisfactorily without resort to a mid-leg amputation. Artificial limb makers often unjustly condemn the Syme's operation because it is difficult to fit a prosthesis to the stump, and the symmetry of the leg cannot be restored. The latter objection is valid for women only. The correct technique must be mastered.

Mid-leg amputations are generally unsatisfactory. The stump should never be more than 6 in. long, the fibula must be cut short or removed altogether, and

the skin must fit the end of the stump evenly. A conical shaped stump is the best. The best of these stumps will not prove satisfactory in those who have to stand at work and most of them should be reamputated and converted into the Gritti-Stokes type of end-bearing "above-knee" limb. Even those patients who lead sedentary lives are often found to complain that they cannot get a satisfactory prosthesis.

The Gritti-Stokes amputation is preferable to the mid-leg or mid-thigh type because of the advantages offered by an end-bearing stump. Troublesome Gritti-Stokes cases are generally due to improper anchorage of the patella to the femur or failure of union. Reamputation with steel wire for fixation is then indicated. If these stumps will not tolerate constant hard standing, the short thigh corset may be replaced by a bucket allowing the weight to be carried, to a partial extent at least, on the ischium.

The mid-thigh amputation is indicated when life is in jeopardy or one of the other types is not indicated. One should not criticize a surgeon for a poor stump unless one knows the circumstances under which the operation was performed.

In the discussion of this paper A. B. LEMESURIER of Canada also praised the Syme's amputation. LEO ELOESSER of San Francisco believes the Syme's stump superior to all others. Many mid-leg stumps can be made end-bearing if the tibial condyles are properly padded so that they do not slip up and down in the prosthesis. Colonel N. T. Kirk of the United States Army also praised the Syme's stump and stated that the Canadians have developed an excellent type of prosthesis to fit them.

CHESTER C. GUY, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Saland, G.: Acute Occlusions of the Peripheral Arteries; Clinical Analysis and Treatment. *Ann. Int. Med.*, 1941, 14: 2027.

An analysis of 31 cases of acute closure of the peripheral arteries, 13 due to embolism and 18 to thrombosis, is presented. Embolism occurred in younger individuals and fibrillation was a frequent precursor. Heart damage was the underlying condition in all of the patients with embolism and in 78 per cent of those with thrombosis. Acute closure below the popliteal artery seldom caused gangrene. Watchful waiting in 8 patients was followed by loss of limb in 62.5 per cent and by a known mortality of 62.5 per cent. With conservative treatment the limb was saved in 95 per cent of 23 cases. The use of alternate suction pressure combined with vasodilating procedures is considered an efficient method of therapy which produces a high percentage of saving of limbs, a low percentage of gangrene, and a reduction in mortality. WALTER H. NADLER, M.D.

Dalsgaard, E. C.: The Treatment of Phlebitis of the Lower Extremities with Paravertebral Novocaine Injections of the Lumbar Sympathetic Ganglia—Leriche (Behandlung der Venenentzuendung der unteren Gliedmassen mit paravertebraler Novocaininjektion in sympathische Lumbalganglien —Leriche). *Nord. Med.*, 1940, p. 2048.

The author treated 20 patients with phlebitis of the lower extremities with paravertebral novocaine injections of the lumbar sympathetic ganglia according to the method of Leriche. He then drew the following conclusions:

The treatment leads to an immediate cessation of pain as well as to a rapid cure of the phlebitis. The frequency and severity of complications are decreased markedly. The danger of embolism is likewise decreased. Lung infarcts were not seen at all. The method itself can be considered as harmless. Apparently there are no contraindications. Compared with the former method of treatment—rest of the affected limb until cure—this method is a decided improvement. The author can corroborate the previous good results obtained by others. The author then discusses the pathogenesis of phlebitis and the ideas of Leriche which led to the use of the method. (HAAGEN). LEO A. JUHNKE, M.D.

Rossi, C.: Considerations on a Case of Embolism of the Axillary Artery; the Importance of Retrograde Arteriography (Considerazioni su di un caso di embolia dell'arteria ascellare: importanza dell'arteriografia retrograda). *Arch. ital. di chir.*, 1940, 59: 549.

The successful treatment of embolism requires early diagnosis of the disorder and embolectomy. The diagnosis must include the exact localization of the obstruction because it facilitates intervention and, in case of failure, allows the use of other methods of adjuvant indirect treatment. Arteriography is a valuable diagnostic aid, but seems to have been little used up to the present time. It reveals the exact position of the embolism, the presence of multiple embolisms, and the condition of the collateral circulation, and it establishes the differential diagnosis between true embolism and vascular spasm, whether caused by a micro-embolism or venous thrombosis. There are various reasons why arteriography is rarely used: (1) in most cases clinical examination and oscillometry give the approximate position of the embolism; (2) nearly always the embolism is located at the root of the extremity and therefore at a point where arteriographic examination is difficult; (3) arteriography imposes a loss of time in a pathological condition in which urgent intervention is indicated; and (4) it is feared that the contrast substance may cause damage to the intima of the vessel.

Rossi describes a personal method which he thinks will contribute to the popularization of arteriography in embolism of the extremities. The patient in whom he used it suddenly developed an embolism in the right arm; no pulsations could be felt in the radial or humeral artery at the elbow, and oscillometry revealed only some minimal beats in the middle third of the upper arm. At operation, ten hours after the incident occurred, the humeral artery was exposed somewhat above the elbow and was found to have a normal aspect and caliber but no pulse. Arteriography with 8 c.cm. of a thorium solution showed complete permeability of the peripheral part of the artery; the same amount of opaque substance was then injected against the arterial current to perform a retrograde arteriography which revealed an obstruction in the axillary artery between the anterior and posterior circumflex arteries and the subscapular artery. The roentgenogram demonstrated the permeability of the arteries of the shoulder, which established a communication between the subclavian and axillary vessels. The axillary artery was opened and three small thrombi were extracted. The radial pulse recurred immediately and the other symptoms disappeared. Two hours later, the radial pulse became weak and ceased again, but the hand and forearm remained in good condition.

The author has tried retrograde arteriography in the dog by injecting rapidly 5 c.cm. of thorium solution into the posterior tibial artery between the internal malleolus and the Achilles tendon; the roentgenogram showed complete filling of the femoral artery, of all its peripheral branches, even the smallest, and of the external iliac artery. Ligation of the femoral artery in Scarpa's triangle and repeti-

tion of the injection gave a good but slightly less complete picture, especially for the deep femoral artery; the opaque substance was arrested at the level of the ligature and reappeared a little higher, because of the well developed collateral circulation. Consequently, it is possible to obtain a perfect picture of an artery and its branches by injecting it against the current; an obstacle in the artery can be demonstrated above the injected site, and the injection reveals the condition of the collateral circulation. In addition, the thorium solution is tolerated perfectly by the vessel even when it is injected twice within a short time. The disappearance of the radial pulse some time after the intervention which had reestablished the circulation is not surprising, but is the rule according to all statistics on embolectomy; later, it recurs slowly, which indicates the establishment of a collateral arterial circulation.

RICHARD KEMEL, M.D.

Schaer, H.: Arteriectomy in Endangitis Obliterans (Zur Arteriektomie bei Endangitis obliterans). *Chirurg*, 1940, 12: 730.

A short survey of surgical management with experiences in periarterial sympathectomy, lumbar or cervical sympathectomy, and arteriectomy is presented. Four cases of vascular occlusion from the Zurich Clinic are reported. The abbreviated case histories are:

1. A nineteen-year-old patient suffered from local frost-bite with thrombosis of the left radial artery. After a month's conservative management yielded no results, resection of the artery was done with brilliant results.

2. Eighteen centimeters of the left femoral artery were resected in a thirty-nine-year-old man because of an occlusion. A thrombosed segment of vessel remained above the site of resection. The operation was therefore not radical in the sense of Leriche, and for that reason there was only temporary improvement with a return to the former condition after a few weeks.

3. In a forty-two-year-old patient the femoral artery on the right side was resected for a distance of 15 cm.; a portion of thrombosed vessel was left behind. The improvement was very slight.

4. In a sixty-five-year-old patient with paresthesia of all the fingers there was, in addition, a gangrene involving the tips of the first to third fingers. There was still a weak palpable pulse in the radial artery but pulsation in the ulnar artery was absent. Following periarterial sympathectomy of the brachial artery improvement lasted only a few days. Anesthetization of the stellate ganglion as a preliminary trial procedure caused an extraordinarily striking improvement in the blood circulation, but removal of the ganglion resulted in only short lasting success. Arteriography was then done which showed complete obliteration of the ulnar artery and extensive destruction of the radial artery, which appeared to be supplied primarily through a collateral vessel of the interosseous artery. Resection of the occluded ulnar artery was followed by striking improvement in the ulnar portion of the hand while radialward the condition remained unchanged. After six weeks resection of the radial artery was done with healing of the necrosis in a few weeks and practically complete disappearance of all complaints. A follow-up three and one-half years after the last successful procedure showed complete freedom from complaints.

From these observations one may conclude that after the employment of all conservative measures the extent of the process must be ascertained through an arteriogram. If the resection is to be carried out into healthy or near-healthy tissue, the thrombosed artery should be removed as completely as possible. Periarterial sympathectomy is not indicated because of its regular tendency to produce only passing improvement. If the extent of the thrombosis is so great that operative removal of the entire diseased vessel cannot be done, ganglion or sympathetic-chain resection is indicated.

(STAHNKE). JOHN L. LINDQUIST, M.D.

BLOOD; TRANSFUSION

Denstedt, O. F., Osborne, D. E., Roche, M. N., and Stansfield, H.: Problems in the Preservation of Blood. *Canadian M. Ass. J.*, 1941, 44: 448.

Among the factors that have a marked influence on the stability of the corpuscle during storage are the concentration of the diluent or preservative, and the degree to which the blood is diluted. Optimal preservation is obtained with an isotonic citrate-glucose diluent using one volume of blood to one-half of diluent as follows:

Blood: 5 parts.
Isotonic (3.2 per cent) sodium citrate: 1 part.
Isotonic (5.4 per cent) glucose: 1.5 parts.

Good preservation is usually obtained over a range of dilutions, namely between 1:¼ and 1:1, but the 1:½ mixture has been found most satisfactory for bloods in general. Blood diluted with more than an equal volume of citrate-glucose undergoes no more hemolysis during storage than in lower dilutions, but is much more fragile to normal saline or fresh plasma. Since it is impossible to tell from the appearance of stored specimens how stable or fragile the corpuscles are, it is recommended that samples be tested against compatible plasma or a suitable hypertonic saline solution. This, at least, will give some information as to how the corpuscles would behave on transfusion.

The oxygen-carrying capacity of hemoglobin remains unchanged during the period of storage, feasible on the basis of survival of corpuscles.

Crosbie, A., and Scarborough, H.: Studies on Stored Blood. Changes in the Erythrocytes During Storage. *Edinburgh M. J.*, 1941, 48: 253.

The authors note that one of the many factors which determine the period for which stored blood may be safely used for transfusion is the degree of

hemolysis present. Intravenous injection of a large amount of incompletely hemolyzed blood may produce a severe and even fatal reaction. Although the concentration of hemoglobin in the plasma necessary to produce toxic effects is not known, it is agreed that the injection of an amount sufficient to produce "hemoglobinuria" is undesirable. It is known that the behavior of erythrocytes during storage is influenced by the constituents of the anticoagulant solution and by the degree of dilution of the blood.

In summarizing, the authors state that a study of the effect of storage upon the erythrocytes in blood mixed with 3.8 per cent sodium citrate to give a final concentration of citrate of approximately 0.38 per cent has revealed the following changes:

1. A gradual fall in the erythrocyte count begins immediately when the blood is stored. The curve relating erythrocyte count to length of storage is asymptotic, the reduction in the count being greater in the earlier weeks of storage. Considerable variation was, however, found between one blood and another. The magnitude of the fall and also the percentage fall are dependent on the initial erythrocyte count, being greater with higher counts. It cannot be definitely stated that the progressive fall in erythrocyte count is entirely due to rupture of cells, since "ghost" corpuscles are found in stained films. Such dehemoglobinized cells would not normally be enumerated in the erythrocyte count.

2. The progressively altering relationship between the total hemoglobin content and the erythrocyte count is indicated by changes in the color index, which are subject, however, to marked variation between one blood and another.

3. There is an initial increase in corpuscular volume during the first twenty to thirty-five days of storage. This more than compensates for the fall in erythrocyte count during this period. Thereafter the corpuscular volume remains constant for at least seventy to ninety days. The increase in corpuscular volume is due to the gradual development of spherocytosis. It occurs in the presence of a hypertonic solution outside of the cells. These two facts taken together would appear to indicate marked alterations in the properties of the cell envelope.

4. The volume index and the mean corpuscular volume show a steady increase from the first day of storage. The volume index exceeds unity within the first two weeks of storage, and the mean corpuscular volume exceeds the upper limit of normal within the first fifteen days. These changes suggest that the erythrocytes are becoming more spheroidal during storage.

5. The gradual development of spherocytosis is confirmed by determinations of the corpuscular diameters, mean corpuscular average thickness, and diameter-thickness ratio. The time taken to attain the spheroidal state varies from about three to ten days.

6. The erythrocytes attain the spheroidal state at approximately the same rate since anisocytosis does not develop during the process. After the twentieth or twenty-fifth day of storage all the spheroidal cells are of virtually the same size.

7. Photomicrographs reveal the altered appearance of the erythrocytes, which seem to be smaller although their volume is actually increased.

In concluding, the authors state that there can be no doubt that the development of the spheroidal state is closely associated with an increased fragility both to mechanical and osmotic influences.

HERBERT F. THURSTON, M.D.

Eerland, L.D., and Behrend, M.: The Transfusion of Preserved Blood Plasma (Ueber Transfusion konservierten Blutplasmas). *Nederl. Tijdschr. v. Geneesk.*, 1940, p. 4118.

Formerly, infusions of 0.9 per cent sodium-chloride solution alone or with the addition of gum arabic were used successfully at the University Surgical Clinic at Groningen in cases of circulatory weakness. However, there were also cases of postoperative collapse (4 cases following operations on the lung, kidney, and prostate gland, and bone transplantation) in which sodium-chloride infusion was useless and restoration of the blood pressure was achieved only by the injection of blood plasma. The Netherlands Red Cross established depots for the deposit of blood plasma, which was produced according to the procedure of De Vries. However, this plasma contains also some red blood corpuscles and therefore is not indefinitely permanent. During the Spanish War the experience of Russian, German, and American physicians has taught that not the red blood corpuscles but the plasma is of decisive importance for the relief of circulatory weakness.

The plasma of the Blood Group AB is borne well by everybody. Besides, with injections of from 20 to 50 c.cm. of plasma the same effect is achieved as with much greater amounts of blood. In the preparation of the plasma, the procedure must be carried out under bacteriological control in an absolutely sterile manner, with sterile clothing as in an operation, and also with exclusion of air infection, and the blood must be taken with a boiled puncture cannula. This cannula is washed through with an ethereal paraffin solution (paraffin with a melting point of 45 degrees) and connected by a rubber tube rendered sterile in distilled water, with a glass flask made of Jena glass (Ampullax-glass), holding 800 c.cm. This flask is supplied with a tube on the side for the escaping air and bears a graduated glass ampule, which may be closed with a stopcock in the perforated stopper, of about 260 c.cm. for the anticoagulant sodium citrate solution. The sodium-citrate solution should be prepared fresh each time with 1 liter of double distilled water, 5.5. gm. of sodium citrate, 0.5 gm. of sodium chloride, 0.2 gm. of calcium chloride, and 0.45 gm. of magnesium sulfate. Before the taking of the blood, which should be taken from a fasting donor, the floor of the flask should be covered with citrate solution. Altogether the authors draw 390 c.cm. of blood and mix this by

a little shaking with 260 c.cm. of the citrate solution. Then 10 additional c.cm. of blood are taken for the Wassermann reaction. The blood mixture is drawn off with a sterile water pump and filled into 4 sterile glass cylinders of 150 to 175 c.cm., which are closed with sterile aluminum caps. The 4 cylinders are then centrifugalized for thirty-five minutes (about 3200 revolutions), and with the aid of the water pump the plasma is transferred into the pointed plasma ampules with careful avoidance of air bubbles. After the transfer the pointed ends are melted together. The plasma (1 c.cm.) from the cylinder is sent for bacteriological examination. In order to avoid an infection, the plasma ampules are supplied before the mixing with a few drops of superol solution (1:1,000), and for every 50 c.cm. of plasma 1 drop of superol solution is used. After the closure by melting the ends, the plasma ampules are placed into an incubator for three days for testing and, if no infection follows, they are enclosed in black paper and preserved in the upright position in an ice-box at 4° C. Every ampule is supplied with the date of the taking of the blood, the name of the donor, the blood group, and the amount of the plasma. The extremely important cleansing of the glassware is done according to the directions of De Vries.

After 27 tests made in this way, some of the ampules remained sterile and useful up to seven months. Before it is used, the ampule is placed for half an hour in warm water of 40 to 42 degrees. In this way, most of the flocculi floating in the plasma disappear; the remaining flocculi consisting of fibrinogen and blood platelets are filtered off through sterile gauze. Ampules that have been warmed once should not be used again. For a blood transfusion, 2 or 3 ampules are necessary, the content of which should be injected into the circulation of the patient at a rapidity of from 5 to 10 c.cm. per minute. No harmful results have been observed.

(Duncker). Louis Neuwelt, M.D.

Rose, B., Weil, P. G., and Browne, J. S. L.: On the Use of Concentrated Pooled Human Serum and Pooled Lyophile Serum in the Treatment of Shock. *Canadian M. Ass. J.*, 1941, 44: 442.

The effectiveness of two types of pooled human serum was studied. One preparation was made by placing serum in collodion membranes and concentrating it to approximately one-third of the original volume; the other "lyophile" preparation was made from serum that had been evaporated to dryness from the frozen state. Thirteen patients, of whom 5 were in shock, were treated with the concentrated serum, and another patient was given concentrated typed serum. Reactions were observed in 5, or 35 per cent, of the cases, and death followed in 2 of them. In 7 of the 9 cases in which no reaction occurred, the results of serum therapy were beneficial.

This type of serum was considered contraindicated in the treatment of shock because of the frequency and nature of the reactions observed. Sixteen patients, not in shock, received transfusions of lyophile serum and no severe reactions were noted.

Walter H. Nadler, M.D.

SURGICAL TECHNIQUE

WAR SURGERY

Jordan, E. P., and Halperin, G.: Tetanus Toxoid for Prophylaxis. *War Medicine*, 1941, 1: 227.

The desirability of active immunization against tetanus is generally recognized. The evidence indicates that a considerable amount of time is required before adequate active immunity can be established with toxoid, and any program in order to be effective must be initiated a considerable time before exposure is likely to occur.

Since the introduction of formaldehyde-treated toxin or toxoid by Ramon and his colleagues (about 1923), a vast amount of work has been done to determine the best preparation to employ and the preferred method of immunization. Although no international standard for tetanus toxoid has been adopted, little variation has appeared to result from its preparation as practiced in various parts of the world.

According to the present consensus, alum-precipitated toxoid is the preferred preparation. Two doses of 1 c.cm. each, given from one to six months apart, generally produce good primary immunity. After several months a third or boosting dose results in rapid stimulation of antitoxin production with consequent high relative immunity.

Although the value of the technique has been confirmed by laboratory determination of the levels of serum antitoxin in human beings and in animals, the most important available clinical test of the effectiveness of tetanus toxoid was provided by the evacuation of Dunkirk. Many men arrived in Britain five or six days after being wounded without having received an additional dose of antitoxin. Among the small percentage who were unprotected by immunization, tetanus occurred in 8, while among the large proportion of patients who were actively immunized, tetanus did not develop in a single case.

It is also found practical to combine tetanus toxoid with diphtheria toxoid, or with typhoid and paratyphoid vaccine when immunization against these other diseases is indicated.

Children can be routinely immunized with tetanus toxoid and diphtheria toxoid, and there appears to be no evidence which would tend to contraindicate this procedure.

There has been immunization with tetanus toxoid alone or in combination with other substances of millions of persons (the exact number cannot be determined) and it has been found to be associated with only rare reactions. It is the consensus of opinion that immunization should be employed in the cases of all military personnel and all others whose occupations place them in positions of special liability to tetanus infection.

GEORGE A. COLLETT, M.D.

Rhoads, J. E., Wolff, W. A., and Lee, W. E.: The Use of Adrenocortical Extract in the Treatment of Traumatic Shock of Burns. *Ann. Surg.*, 1941, 113: 955.

There is little evidence to indicate that adrenocortical extract increases the plasma volume *per se*. No striking recovery of plasma volume was found, unless large amounts of plasma were administered. Apparently, adrenocortical extract reduces the permeability of the damaged capillaries and thereby enables the vascular compartment to retain a large proportion of the plasma protein placed in it by transfusion. In both man and animals, the beneficial effect of adrenocortical extract is most striking when it is given simultaneously with an adequate transfusion.

Adrenocortical extract is recommended in the treatment of patients with extensive burns:

1. To reduce the amount of plasma required to restore the circulation to normal.
2. To reduce the amount of plasma protein which enters the interstitial fluid.
3. To shorten the period of stagnant anoxia with a view to reducing visceral injury to a minimum.

A marked chloride retention occurs in patients receiving adrenocortical extract. Such patients should not be given any sodium chloride, unless its administration is indicated by chemical analysis of the blood.

SAMUEL KAHN, M.D.

Kirschner, M.: The Treatment of Gunshot Wounds (Die Behandlung der Schussverletzungen). *Ztschr. f. d. aerztl. Fortbild.*, 1940, 37: 257.

This treatise is confined to "gunshot wounds as such" and consequently deals with the mechanical effect of the bullet on the skin, soft parts, and bones; therefore it includes 95 per cent of all war injuries. A severe hemorrhage should be arrested as quickly as possible by ligation of the extremity, pressure, or ligation of vessels at the site of injury. Ligation at the point of election is no longer practiced. Transfusions of preserved blood are available in the front lines from blood banks back home to combat the effects of hemorrhage. The danger of infection is least with rifle bullet wounds (44 per cent) and greatest with mine wounds (100 per cent).

The "rough projectiles" damage tissues severely. Grenade wounds especially are frequently associated with shattering of the bones, the bone splinters acting as secondary missiles. Heat from the explosion also injures tissues. In this manner the factors which favor the development of infection are produced. Wounds which are caused by smooth-surfaced projectiles can be left alone without operative interference; wounds due to rough projectiles demand operative care as soon as possible.

These rules are first carried out in the field hospital to which the wounded are transported with a tem-

porary dressing. The tissue surrounding the wound is cleansed and the skin is disinfected with cephirol solution. Complete débridement of the wound, with the cutting done through the healthy tissue is preferable, but this is not often possible. Projectile splinters and other foreign bodies are removed only when this can be done with ease. Bone splinters are removed only when they are entirely free. Occasionally a cut tendon or nerve can be sutured; in rare cases a vessel can be sutured.

The author prefers rivanol solution (1:1000) as a chemical antiseptic for the irrigation of wounds and iodoform (vioform) for gauze. Gunshot wounds are left widely open. In only exceptional cases may they be partially closed and drained, but they are practically never closed completely. If no inflammatory phenomena appear secondary suture may be done.

The question of operation of these wounds depends upon the time interval. However, even in late cases operation may be successful and at any event must be attempted.

Antitoxin (tetanus antitoxin and gas-bacillus serum) is administered as a prophylactic measure. The internal administration of antiseptics like prontosil is hardly profitable. Of greatest importance in the combating of infection is complete immobilization of the wounded limbs, especially if bones are injured, in which case reduction of the fracture can be considered only if the danger of infection is not a contraindication. Different types of plaster bandage may be used for splinting and traction. For transportation from the front lines for the first clinical treatment, the simplest and best procedure for a fracture of the arm is to fasten it to the body. Fractures of the lower extremity are immobilized in traction transporting splints without attempts at reduction. Until the danger of infection has passed, the wounded should be transported as little as possible even within the hospital. All necessary dressings and other measures should be carried out in the bed of the wounded. The physician shall come to the wound but not the wound to the physician.

(GENEWEIN). EDWARD W. GIBBS, M.D.

Matthews, D. N.: The Surgery of Air-Raid Casualties. *Ann. Surg.*, 1941, 113: 910.

The author discusses the treatment of the following casualties:

Shock and hemorrhage. Plasma is ideal in the treatment of these cases, and is used in the form of citrated plasma. In cases of severe hemorrhage, whole blood is needed to replace the loss. All stored whole blood and all stored plasma must be filtered before its administration.

Chemotherapy has been of inestimable value in preventing sepsis and in sterilizing old chronically infected wounds. All raw surfaces are sprayed with sulfanilamide powder, whether they are to be sutured or left open; it is quite safe to produce a thin white covering, no matter how extensive the injured area is.

Compound fractures. These are extremely common. The principles governing their treatment may be summed up as conservative amputation, large incisions to remove lacerated muscles, liberal spraying with sulfanilamide, and rest of the affected limb in a plaster-of-Paris splint, which is cut from end to end and windowed over the wound.

Gas gangrene. Large incisions are made, with no thought to the cosmetic appearance, and all muscle is removed, until normal bleeding occurs. Sulfanilamide is then sprayed throughout the entire wound, which is then lightly packed. Anti-gas-gangrene serum is administered (40 c.cm.) and 30 gr. of sulfanilamide are given daily by mouth.

SAMUEL KAHN, M.D.

Wenzl, H.: Has the World War Definitely Decided in Favor of the Necessity of the Suture of Blood Vessels? (Hat der Weltkrieg eindeutig fuer die Notwendigkeit der Gefaessnaht entschieden?) *Wien. med. Wchnschr.*, 1940, 2: 932.

This question is answered decidedly in the affirmative. The author compares the advantages of suture and ligation of blood vessels. This study is particularly valuable because in recent times suture as compared with ligation has been pushed into the background by some of the leading clinicians of Germany (Magnus, Sauerbruch). The author presents a concise but nevertheless complete review on gunshot wounds of blood vessels and emphasizes the most important features.

Spontaneous healing of shot wounds of blood vessels, even with complete shootings off, does occur. However, it is never seen in penetrating gunshot wounds of the large blood vessels. Early ligation previous to the formation of the collateral circulation of large vessels naturally leads to necroses more often than late ligation. Lexer considers the figures of Wolf as too low. These indicate gangrene in 50 per cent of the cases of involvement of the common iliac artery, 25 per cent in involvement of the femoral artery below the profunda, 15 per cent for the popliteal artery, 12.7 per cent for the external iliac artery, 15 per cent for the axillary artery, and 4.8 per cent for the subclavian and brachial arteries. These represent the figures for peace times. Following ligation of the popliteal artery at the dressing stations and field hospitals the author always found gangrene.

Aneurysms were rare in former wars; for example, there were 44 in the War of 1870 and 1871. With the introduction of the small-calibered infantry projectiles and through the reduction in size of the grenade splinters as a result of a greater explosive charge, the number of aneurysms has considerably increased. The arteriovenous aneurysms exceed the arterial in number; however, the latter generally become larger and cause more severe symptoms. In the former the aneurysmal varix and the arteriovenous fistula predominate. The larger arterial aneurysms rapidly lead to nervous symptoms and, particularly, to contractures of the joints, which may be difficult to relieve even after an operation. With these, furthermore, there is the much greater danger

of bursting and embolism. When aneurysms are small, spontaneous healings certainly occur; but with arteriovenous aneurysms they are very rare. Conservative treatment by compression may lead to healing, but often this is only an apparent healing.

As to the question of early or late operation, there should be a delay of from three to five weeks to allow the formation of the collateral circulation, provided infection, the danger of hemorrhage, marked nerve pains, or marked contractures do not demand an intervention earlier. Bier and Haberer believe that an aneurysm may be operated upon at any time if asepsis is assured. The operation for arteriovenous aneurysms is more difficult than that for arterial aneurysms.

The choice lies between the operation of Antegelus, in which the artery is ligated above and below the sac; that of Phylagrius, in which the sac is removed in addition; that of Kikuzi and von Frisch, in which the sac is opened and the vessels within the sac are ligated or sutured if there is anemia or temporary compression of the afferent and efferent main blood vessels outside of the sac, and in this way the collateral circulation is completely spared; and the operation of Brasdor and Wardrop, in which the artery is ligated only peripherally. It is certain, however, that ligations in operations for aneurysm lead to gangrene more rarely than in clean, fresh injuries of the blood vessels; but the method of Phylagrius, in which the sac is also removed and with it the collaterals, produces more gangrene than the procedure of Kikuzi and von Frisch.

Another matter for discussion is that with ligation of an artery the simultaneous ligation of the uninjured vein also is always demanded by some authors, because there is already a deficient blood supply from the collateral circulation after the ligation of the artery, and without ligation the vein from the peripheral area continues to draw off blood and produces more ischemia. In support of the correctness of this thought Sehrt shows that in the lower extremity the ligation of the artery alone results in gangrene in 20 per cent of the cases, as compared with gangrene in only 9 per cent of the cases following ligation of the artery and vein; in the upper extremity the ligation of the artery alone produces gangrene in 7.8 per cent of the cases, as compared with no gangrene at all following the simultaneous ligation of the artery and vein. However, noted surgeons like von Haberer, Graf, and Fromme repudiate this method. The author believes that according to the investigations of Gruber and Werner stasis in the cerebral vessels may be just as dangerous as ischemic necrosis. In order to avoid both of these dangers, suturing should be done. In regard to the collateral circulation signs of Moskowicz and Coenen, he emphasizes that neither of the two is absolutely reliable, and cites examples from Bier and von Haberer.

The author then takes up the matter of suture of the blood vessels and discusses the history (Lambert, Jassinowsky, Jaboulay, Brian, Murphy, Doerfler, Carrel, and Jeger). In 1902, Murphy was the first to perform a circular suture on man. The important consideration involved is that the intima comes to lie upon intima. The method generally used today is that of Carrel, with the three stay sutures, whereby the rounding of the vessel is changed into an equilateral triangle. This method should be used only in the sanitary units situated in the rear, as rest and asepsis are not possible at the front. Vascular defects of 5 or 6 cm. may be overcome with the circular suture even with extreme positions of the joints. After fourteen days, gradual stretching may be begun without danger to the suture. In 1 case Rehn was enabled to suture the stumps of the subclavian artery circularly after a resection of 4 cm. of the clavicle.

With larger defects there then comes up for consideration the transplantation of veins, which was carried out successfully several times by Lexer and others; however, the danger of thrombosis is a great one. Nevertheless this procedure is preferable to the simple ligation. The lateral suture is very much simpler than the circular, but this must be carried out in the longitudinal direction of the artery, so that a constriction of the lumen is avoided. According to Bier, success can almost always be achieved in aneurysms with the lateral arterial suture, if the procedure of Kikuzi is used. According to Coenen, ligation should not be done even on the large veins, but rather the lateral suture.

The results of suture are good. von Haberer carried it out 140 times with 4 fatalities, and in 56 cases he had to ligate with a result of 8 fatalities. Among 12 sutures of the common carotid artery he achieved healing 11 times, with 1 fatality, but in the last case the esophagus was also injured. In 18 of 24 subclavian aneurysms he sutured and in 6 he ligated; 3 of the latter patients died. Above all, the ischemic disturbances of the extremity, which are very common after ligation, are not found after suture, even when thrombosis occurs. In only 5 of 17 cases of ligation at the von Eiselsberg Clinic, complete functional capacity of the extremity had been retained when later follow-up investigations were made. Even with simultaneous fracture of the long tubular bones the extremity may be kept intact by suture in fresh vascular injuries or aneurysms, whereas ligation almost always leads to gangrene. Even slight infections need not impair the suture.

A large bibliography is appended. However, the statistics of Heydrich and Franz are not considered. From the World War the latter could figure that the fatalities after ligation were about 4 times as frequent as those following suture, namely, 14.7 per cent to 3.8 per cent, and that the gangrene after ligation amounted to 10.5 per cent, but after suture to only 3 per cent. (Franz). Louis Neuwelt, M.D.

Rea, R. L.: The Repair of Lacerated Eyes. *Brit. M. J.*, 1941, 1: 555.

This article may be looked upon as a plea for saving the damaged eyeball. The following proce-

dure, which is known as Kuntze's operation, is recommended:

The lids are gently held apart by an assistant and lifted off the eyeball to avoid all pressure and the consequent squeezing out of the contents of the eyeball. A few drops of 5 per cent cocaine and some of the same merthiolate solution are used to clean the conjunctival sac, but washing out should be avoided. On the side nearest to the wound the conjunctiva is picked up and cut with a scissors, a ribbon being formed which can be gently slipped down over the cornea and laid over the length of the corneal wound. At each side the ribbon is held in place by a suture. Both eyes are bandaged. In four or five days the sutures will cut out, and often the ribbon will retract and show a healed cornea.

The largest wound of the eye ever repaired by the author was a transverse cut across the cornea and as far again through the sclera.

LESLIE L. MCCOY, M.D.

Ivy, R. H., and Stout, R. A.: Emergency Treatment of War Injuries of the Face and Jaws. *Ann. Surg.*, 1941, 113: 1001.

A correlated plan of treatment of injuries of the face and jaws, if carried out from the advanced zone to the installations in the rear, will shorten the period of disability and restore function and appearance more nearly to normal. Such a plan is being prepared by the Surgeon General and special training is being given to medical and dental officers whose close cooperation is most important in handling these injuries. A manual covering the various phases and problems of treatment is in the course of preparation.

The most advanced unit, the mobile surgical hospital, will have a maxillofacial team consisting of a surgeon and a dental surgeon. The initial emergency care will be given at advanced posts or battalion aid stations where first-aid packets containing equipment for carrying out procedures demanding special attention will be available. A medical and dental officer are assigned to these stations.

There are four points of importance in this emergency care:

1. Hemorrhage may be controlled by digital compression over the artery lying proximal, or a pack in the wound itself held in place by a bandage can check bleeding by pressure. Care must be taken not to interfere with respiration. Occasionally vessels will have to be clamped and ligated.

2. The respiratory airway may be inadequate if there is much loss of bone and muscle. This can be controlled in several ways, by a stitch or safety pin through the tongue to pull it forward, by a rubber tube through the nose or mouth into the nasopharynx, or by a tracheal puncture or tracheotomy.

3. Temporary approximate reduction and fixation of bone fragments is carried out by the dental officer. The wound is cleaned, and tooth fragments, foreign matter, and completely detached fragments of bone are removed. The fragments remaining attached to soft tissue are preserved and reduced by manipulation, and fixed temporarily by bandage and elastic traction. Fixation of lower to upper teeth is not done prior to unattended travel. These procedures help to relieve pain and shock, to maintain a clear air passage, and to reduce the danger of recurrent hemorrhage. If there is backward displacement of the upper or lower jaw which interferes with respiration, a simple splint devised at the Walter Reed General Hospital has been found useful (Fig. 1). The elastic band can be attached in this to the upper and lower teeth and constant traction will be maintained.

Fig. 1. Forward traction of either upper or lower jaw by emergency apparatus made from tongue depressors and bandage. (Courtesy of J. B. Lippincott Co.)

Soft-tissue repair should not be attempted in large gaping wounds of the face before at least temporary reduction and fixation of the bone fragments has been carried out. It is often better to cover exposed ends of bone by suturing skin to mucous membrane, and thus hasten healing and permit earlier permanent reparative procedures. Dependent drainage of all wounds of the lower jaw communicating with the mouth is essential.

4. Transportation from the combat zone to hospitals in the rear presents the usual problems of shock, sedation, and feeding. There is convincing proof that these patients should be transported sitting up. They should be transported face down if any danger of respiratory obstruction exists.

The base hospital is provided with adequate equipment and special personnel to care for these patients but much depends on the kind of preliminary care given in the more advanced zone.

BRADFORD CANNON, M.D.

Hauenstein, K.: Gunshot Wounds of the Jaws, Their Treatment and Prognosis (Die Schussverletzungen der Kiefer, ihre Behandlung und Prognose). *Med. Welt*, 1940, p. 1189.

The author discusses the main problems of gunshot wounds of the jaws in a concise manner. He calls attention to the fact that most of the time, with the exception of very cold weather, the face remains uncovered and therefore the wounds are not contaminated by infectious particles of clothing. He also points out that the blood supply to the smooth muscles is very good, and that the saliva does not play a great role in producing infection in spite of the numerous bacteria present.

The author maintains that the fracture of the jaw should receive attention before the injured soft parts are taken care of. Although the eight-hour limit is thus frequently passed, this seems to be of no great practical importance. The delayed secondary suturing is very important in injuries of the face. The wound should never be completely closed; a provision should always be made for drainage of the secretions.

The treatment of the fracture may be divided into two phases: the temporary and the permanent. When teeth are present, any type of wire splint is the simplest treatment. Sometimes a rigid or semirigid intermaxillary dressing may be necessary. Rubber or metal splints are employed if no teeth are present. If the angle of the jaw is fractured, it is advisable to apply a pad pushing the ascending branch of the jaw in a dorsal and downward direction. If the neck of the jaw is broken, the author places a cork slice between the molar teeth and approximates the central portions of the jaws with intermaxillary bands in order to counteract the pulling effect of the muscles. If the upper jaw is broken in such a manner that it is separated from the base of the skull, intra-oral or extra-oral dressings are used. Teeth located between the fragments must not be removed in every instance. Removal must be made according to the conditions found. Frequently the teeth must be left *in situ* to facilitate the application of splints.

Traumatic exposure of the sinuses is of great importance; radical procedures are not advisable in cases of this type. Irrigation and tamponade may be followed by good results. Only loose bone fragments should be removed. Even if the base of the orbit is fractured, the eye can be lifted by placing sponges in the maxillary sinus.

Pedunculated flaps from distant portions of the body are not advisable for the correction of deformities resulting from facial injuries. As a rule sufficient material can be obtained from the face and the neck.

In injuries of the cheeks the mouth may sometimes become too small after secondary suturing or after plastic operations, and in such cases the corresponding pocket of the cheek may be stretched by the introduction of hard rubber wedges which are gradually increased in size.

The author emphasizes the fact that even extensive wounds of the tongue may heal without infection after suturing.

(Franz). Joseph K. Narat, M.D

Schulze, W., and Belzendahl, W.: The Treatment of Infected Shotgun Wounds of the Skull and Brain in The Military Hospital (Zur Kriegslazarettbehandlung infizierter Schaedel-Gehirnschuesse). *Deutsche mil. Arzt*, 1940, 5: 514.

The material for this report consists of 20 wounded, who were under the care of a surgeon in collaboration with neurologists and roentgenologists from the time of their admittance for upward to seven or eight weeks in the military hospital at Lodz during the campaign in Poland. The necessity of this collaboration is emphasized. Certainly it would be nearer the ideal if such patients could be brought directly to the homeland by airplane; however, this is not always possible. Therefore, it is necessary to erect such specialistic stations in the war zone, where the wounded person may remain under the care of one and the same physician for lengthy periods of time.

The majority of the authors' patients came under their care only after two to four days. In 5 of these their condition was worse than what it had been at the H.V.P. (Chief Dressing Station) or the F.L. (Field Hospital), which was ascribable to the conditions of transportation. Two of these patients had an acute psychosis beginning as an excitation stage; 3 were totally unconscious. In the treatment of these conditions the authors recommend the intravenous administration of 40 to 50 per cent "Shockkalorose" (hypertonic dextrose solution), evipan, and avertin. None of these patients had been given a special bandage for transportation, including splints or moulded supports of any sort. The placing of the patient on the hard pillow of the stretcher is bad; inflatable rubber pillows, like the modern air mattress for camping, should be provided. In 3 of the wounded soldiers the skin wound had been excised and then closed by suture at the front line without removal of the focus of maceration in the brain; and as the sutures were opened a flood of pus, splinters of bone, and clumps of brain tissue shot out. Such superficial methods should be desisted from. In 2 of the patients splinter removal had already been done at the front; in the one the dura had not been injured but the macerated focus of the brain had been opened nevertheless and then the dura closed again; this soldier died of encephalitis. In the second, reoperation was necessary, because of the fact that not all the bone splinters had been removed. From these experiences the authors conclude that such procedures at the front line without roentgen control are inappropriate. Two other cases exhibited the manifestations of an already developed inflammation of the coverings of the base of the brain; and 2 exhibited this same condition in its incipient stages. All of these cases showed an already developed infection of the wound. To this might be

added general symptoms; fever with slow pulse, outspoken stupor, raging headaches, vomiting, nausea, lethargy. A few had involuntary stool and urine excretions.

Although the twenty-four hour limit had been surpassed in these cases, the authors resorted to operation, despite the fact that the wounds were already in the intermediate stage. Because of the inflammation of the skin tissues, local anesthetics were not given. Under general narcosis with ether, the wound areas were disinfected with tincture of iodine, the edges of the skin wound excised, and the apertures in the bone widened with the Luer forceps. When the dura had not been injured, the operation was not carried further. When the dura had been opened the wound was washed out, the splinters were removed with the anatomical pincette, and the wound was explored with the finger. No form of suction was applied. The drainage tube was used for twenty-four hours, loose tamponade with iodoform gauze was done, and the lowest strips were not removed until two or three weeks had elapsed. No sutures nor splinted dressings were used. The patient was placed on the sound side. The authors have not been able to make up their minds to do a subsequent suture or transplantation of a skin flap following the cleaning-up of the wound, which was successfully done a number of times by Toennies. Only once during the removal of splinters did the authors experience a severe hemorrhage from the sinus transversus; this was controlled by an implant of muscle tissue.

In the after-treatment special stress is placed on a daily intravenous infusion of 40 to 50 per cent dextrous solution for as long as four weeks; the authors see in this a definite advance in treatment. The raging headaches which follow the operation soon recede; likewise the fact that the authors have experienced only 2 instances of prolapse of the brain in the after-treatment is ascribed to this method; both prolapses underwent a spontaneous (of course, lumbar punctures had been employed) recession. No secondary abscesses were seen during the six to eight weeks which the patients spent in the authors' hospital. On the other hand, 3 instances were observed in which the general condition of the patient and the wound became worse following a banal infection of the pharynx or nose. The excitation or lethargic states appearing at this time were interpreted as a beginning encephalitis, but these manifestations disappeared following treatment with prontosil, lumbar puncture, and a dextrose solution.

There were only 5 deaths, which, in consideration of the fact that only 2 of the cases were mild, grazing shotgun wounds, was a strikingly favorable result. All of the rest were severe infected wounds, mostly tangential, in part with injury to the nasal accessory sinuses, which were immediately opened. Two patients already had a meningitis on admittance; a third had a large defect with extensive opening-up of the ventricle; the remaining 2 developed encephalitis, and of the last 2, 1 had suffered an injury to the brain stem, which before death was manifested as a rapid emaciation with an abnormal appetite for food. When the time came for transporting the patients from the hospital, the 15 who lived exhibited a healed or almost healed wound and a regression of the previously present deficiency symptoms.

The authors then give a detailed report of the case history of the more instructive cases, with 17 illustrations and neurological considerations. Among the latter, it is interesting to note that an unfavorable outcome was indicated by a peculiar apathetic behavior, such as one sees in the catatoniac state.

(Franz). John W. Brennan, M.D.

Caldarera, E.: The Treatment of Thoracopulmonary Wounds (Sul trattamento delle ferite toracopolmonari). *Arch. ital. di chir.*, 1940, 59: 347.

A notable advance in the treatment of pulmonary wounds was made during the World War by the use of artificial pneumothorax, which is the method of choice to stop primary and prevent secondary hemorrhage. In 1933, Latteri treated fractures of the ribs with alcoholization of the intercostal nerves and later recommended his method for simple thoracopulmonary wounds as well as for those complicated by fracture of the ribs, because it accomplishes the anatomical and functional conditions which favor healing of the pulmonary wound and of the fracture. The method causes partial collapse of the lung and has given excellent immediate and late results in the hands of various authors.

Caldarera reports 5 cases of ballistic wounds of the chest and lung complicated by rib fracture, in which he has used this method; the number of intercostal nerves subjected to alcoholization varied from 5 to 8, according to the conditions, and the results did not leave any doubt as to the excellence of the treatment. There is practically complete immobilization of the region innervated by the alcoholized nerves and the lung is placed in a relative state of rest which is sufficient for the purpose. Hemorrhage is completely arrested. As a rule, hemothorax present before alcoholization is left alone because it compresses the lung and helps to stop hemorrhage; it is aspirated only in cases in which it produces threatening symptoms of compression; just enough blood is then removed to eliminate immediate danger. There are cases in which the symptomatology simulates grave pulmonary compression; this is due principally to the pain at the site of fracture which is exacerbated by the respiratory movements, especially inspiration, and results in frequent, shallow respirations; alcoholization of the intercostal nerves causes immediate disappearance of the grave symptoms. Another result of alcoholization is an increase in the vital capacity of the lung as soon as the pain ceases. The remarks made about hemothorax apply also to spontaneous pneumothorax, with or without hemothorax; but spontaneous pneumothorax may be dangerous if pre-existing pleural adhesions have kept the pulmonary wound open; in such a case aspiration of the pneumothorax is indicated at the same time as alcoholization.

According to Latteri, the alcoholization of 5 intercostal nerves should be completed in one sitting; the point of entrance of the projectile should also be included in the territory of the treated nerves. The method is especially valuable for war wounds that need urgent intervention, such as operation or pneumothorax, which cannot be performed in small dressing stations; in such stations alcoholization can easily be done. RICHARD KEMEL, M.D.

Turner, G.: Gunshot Wounds of the Heart. *Brit. M. J.*, 1941, 1: 938.

Gunshot wounds of the heart are usually accompanied by serious damage to the thorax or other parts of the body, and many are associated with infection. The immediate causes of death are the great severity of injury, shock or hemorrhage, and, under hemorrhage, cardiac tamponade. Late deaths are due to sepsis, embolism, or associated injuries.

Acute tamponade results when the injury of the cardiac wall does not permit ready escape of the blood from the pericardium so that the increasing pressure in the sac embarrasses and finally arrests cardiac action. After a latent period, which may be as little as ten minutes, the patient complains of oppression at the heart and becomes uncontrollably restless, while the countenance becomes cyanosed and the body surface cold and moist from perspiration. The big veins at the root of the neck become overdistended, the pulse is irregular and fluttering, the cardiac dullness is increased, and at the same time the heart sounds are muffled and obscure. Unless promptly recognized and treated, the condition is rapidly fatal. Opening the pericardium offers the patient's only chance for survival and is advised so long as some evidence of cardiac function remains.

The diagnosis of cardiac wounds is suggested by situation near the cardiac area, although the wound of entrance may well be in the lateral chest wall, in the axilla, or even in either upper extremity. With a missile impacted in the heart the suspected diagnosis is confirmed only by roentgenography.

Wounds from shell shrapnel are usually more serious than bullet wounds because of the common associated sepsis. Besides cardiac tamponade, the open wound from shell fragments is likewise a surgical emergency, and the indications are to arrest hemorrhage, to treat shock, and to anticipate sepsis. These conditions are met by excising the wound in the parietes, by inspecting the heart, and suturing any bleeding lacerations, or removing a foreign body, if it is easily removable. Foreign bodies that are less accessible are best left alone at this stage; drainage of the pericardium and the resources of chemotherapy are sufficient.

The parasternal exposure of the heart of Theodore Kocher (described in the article, with 3 illustrations) is recommended as the safest procedure when the gunshot wound, even if enlarged, does not give ready access to the injured area. When the heart is exposed it will be found difficult to handle. While it may be pushed from side to side or partially rotated without interfering with the heart action, handling of the base or exerting pressure on the posterior surface at the top of the interventricular septum will invariably stop the heart beat. When the viscus is allowed to fall back, gentle massage will usually restart the beat. To assist in the process of suturing the viscus a stitch may be placed through the thickest part of the muscle wall near the apex. Gentle pressure with the finger tip will usually control bleeding until the sutures can be applied. Turner recommends ooo chromic catgut or fine silk sutures, placed ¼ in. from the wound margins with a good hold in the muscle, and about the same distance apart. A piece of fresh muscle laid over the area will act as a hemostatic patch.

In the severely wounded local anesthesia will suffice. Otherwise there is no contraindication to the judicious use of a general anesthetic.

After the emergency has passed, exploration for missiles lodged in the heart is to be considered, because while they may remain safely imprisoned they may be a source of emboli, may become dislodged, and may be a cause of cardiac irregularity or disability because of the fear of tragic consequences instilled in the patient's mind. The Kocher approach is satisfactory for the intervention. After a decision has been made as to the position of the cardiac incision, sutures should be placed on either side of the proposed cut as they aid in the control of bleeding. The missile must be carefully coaxed out and not forced, and the defect carefully closed with sutures. Foreign bodies in or about the pericardium when associated with sinuses and giving rise to symptoms likewise merit exploration.

EDWIN J. PULASKI, M.D.

Storck, A. H.: Abdominal Injuries. *Ann. Surg.*, 1941, 113: 720.

The destructive character of abdominal injuries incurred in the various theaters of modern warfare, as well as the increased difficulties of collection, transportation, and treatment of abdominal casualty cases have to a great extent counteracted the advances in methods for treating these war injuries. The multiplicity and anatomical destructiveness of most of the present wounds are incompatible with life, and even the injuries which are not inevitably fatal are usually so serious that survival of the patient is dependent upon the employment of every appropriate aid, both non-operative and operative.

The present review of abdominal injuries is limited to a general consideration of the methods, especially certain newer ones, for reducing the incidence of, and ameliorating the seriousness of the injuries.

Preventive measures. Although complete prevention of abdominal injuries is obviously impossible, there are means of substantially reducing the total number as well as the extent and multiplicity of these wounds. Some of these methods are:

1. Education of armed forces and civilians in precautionary measures to avoid injuries caused by

bricks, pieces of cement or concrete, timber and structural steel hurled from buildings, streets, or roads which have been bombed.

2. Airplane and artillery raid shelters.
3. Armor for vehicles and equipment.
4. Body armor. The author presents the arguments for and against the use of body armor.

The arguments against it are that it

a. Adds too much weight to equipment
b. Decreases freedom of motion
c. Deforms bullets
d. Is ineffectual against high velocity direct axial hits
e. Is unacceptable to the soldier
f. Is insufficiently tried.

The arguments for it are that

a. Abdominal wounds are almost invariably fatal
b. Weight requirements are met by new metals
c. Motorized equipment has increased its feasibility
d. It arrests most low velocity projectiles
e. It deflects many high velocity projectiles
f. Most injuries are due to oblique hits by small, low velocity projectiles
g. It improves morale
h. It increases efficiency
i. It conserves man-power
j. It is humane
k. It releases equipment and men
l. It reduces replacement requirements
m. It relieves congestion on roads
n. It was used by invaders during recent conquest of Belgium

Various types of body armor are described and illustrated.

Prophylactic measures. Prophylactic measures are considered in two categories: (1) those which may be instituted in anticipation of possible injury, and (2) those which have to do with the care of patients after abdominal injury has been sustained.

Before injury is incurred. Precautions suggested which may be of value include (a) evacuation of the large bowel and abstinence from food shortly before anticipated injury, (b) possible elimination of bacteria from the intestinal tract by drugs (sulfanilylguanidine), or the feeding of lactobacilli either alone or in conjunction with diet.

After injury is incurred. Provisions should be made for the rapid transportation of the patient to a hospital unit.

The various well known measures for the treatment of shock and hemorrhage, peritonitis, and the care of the wound should be employed.

SAMUEL H. KLEIN, M.D.

Jimeno-Vidal, F.: Gunshot Wounds of the Shoulder Joint (Schultergelenksschussverletzungen. Erfahrungen aus dem spanischen Buergerkrieg 1936-39). *Arch. f. orthop. u. Unfall.-Chir.*, 1940, 40: 545.

This is a very noteworthy and interestingly written work. Eighty-one cases of gunshot wounds of the shoulder joint, of which 67 were fresh and 14 were old (several weeks to months old) are discussed. Of the fresh cases, 10 were admitted before forty-eight hours had elapsed, 28 in the course of the third day, 15 during the first week, and 14 during the first month. Twenty-eight (42 per cent) were infantry bullet wounds; 39 (59 per cent) were artillery wounds; 60 per cent involved the right and 40 per cent the left shoulder. Of purely soft-part injuries there were 7 cases (10.5 per cent). All of these were penetrating wounds and all of the missiles were removed by operation. Extracapsular fractures of the glenoid with fissures into the joint occurred in 10 cases (15 per cent); these were almost always the result of through-and-through wounds of the shoulder blade. Isolated intracapsular fractures of the humerus head occurred in 35 cases (52 per cent). There were the most variable forms of fracture; a typical form was the fracture of the sagittal plane. Intracapsular humerus and glenoid fractures occurred in 2 cases (3 per cent). Isolated splintering of the head of the humerus occurred in 7 cases (10.5 per cent). These cases were, for the most part, through-and-through wounds, in many instances associated with fist-sized wounds of exit, or tangential wounds. Isolated splintering of the glenoid fossa occurred in 4 cases (6 per cent) and for the most part was accompanied by variable fissures and fractures of the entire scapula. Destruction of the entire joint occurred in 2 cases (3 per cent). Altogether there were 15 penetrating gunshot wounds, 47 through-and-through wounds, and 7 tangential wounds; in 2 cases there was an accompanying injury of the radial artery, and in 3 cases injury of the axillary artery. In only 2 cases was the lung also damaged.

Under the clinical course the author differentiates the following:

1. *The aseptic course.* Twenty-eight per cent of the patients had a smooth convalescence during the World War—14 per cent (Boehler), 24.4 per cent (Landois). In this group we are dealing, for the most part, with joint wounds without bony injuries or with only small fissures. The author emphasizes the fact, however, that in one case, with a small entrance and exit wound with small fissures, there later developed a small phlegmon of the capsule.

2. *Infected gunshot wounds of the shoulder joint.* Among these Vidal distinguishes:

a. Synovitis serosa hemorrhagica, 20 cases, or 30 per cent. In these cases temperatures up to 39°C. were reached but they subsided in the course of from three to eight days. If the joint was placed in abduction and an anteversion position a complete restoration occurred in most instances.

b. Empyema of the shoulder joint, 5 cases, or 7 per cent. This can occur only if the gunshot wounds become obstructed. The differential diagnosis between empyema and phlegmon of the capsule is practically of no significance as far as war surgery is concerned, because in almost every case the condition developed into a phlegmon of the capsule.

Even these cases could be brought to complete restitution by proper treatment (puncture and splinting) provided the cartilage is not destroyed.

c. Phlegmon of the capsule, 20 cases, or 30 per cent. This is in reality a cellulitis synovitis. In this condition the formation of an ankylosis offers the best prognosis. This condition usually causes the formation of pararticular abscesses in the posterior portion of the shoulder joint. The fluctuation then shows itself on the posterior inferior portion of the deltoid, and less frequently on the anterior border.

d. Putrid inflammation of the shoulder joint, 3 cases, or 5 per cent. The author never encountered typical gas gangrene. Two cases showed this condition as early as after forty-eight hours; in a third it appeared after six days without any warning. All of these wounds were the result of artillery gunshot, and all the patients had received their wounds at the same place within the course of three hours. Soil and climatic conditions must certainly play a part in this infection. Apparently the putrid infection runs its course only in the soft parts. To be sure, occasional gas blebs occurred in these cases but they could not be regarded as typical gas-gangrene edema. Incisions and splinting of the part caused these putrid infections to subside after eight days.

Although formerly the diagnosis in injuries of the shoulder joint was often difficult, this is not so today because the roentgenogram gives conclusive information. The Spanish Field Hospitals, where the patients were classified, all had portable x-ray apparatus.

The author then discusses secondary septic hemorrhages, 3 cases, or 4.5 per cent. In 2 instances these could be controlled by tamponade and in 1 case the thoracico-acromial artery had to be ligated. Treatment at the first aid station consisted of a sterile dressing and bandaging of the arm to the chest. Theoretically, in the classification station, the proposal, of Franz, Magnus, and Payr, of primary wound débridement and suture of the capsule without skin suture is no doubt correct, but in practice this procedure cannot be easily carried out. In all of the through-and-through gunshot wounds of the joint with minimal entrance and exit wounds, as well as in cases of penetrating gunshot wounds of the joints with a punctiform wound of entrance (68 to 70 per cent) this method does not come into question.

The author emphasized the fact that even if one were able to employ a primary capsule suture, the muscle or skin wound would, nevertheless, have to be left completely open. In the presence of extensive injury of the soft parts, such as severe tangential wounds accompanied by splintering and destruction of the joint, the thought of a primary capsule suture is a "Utopia," and to rely upon a difficult plastic operation is sheer thoughtlessness.

The author is an opponent of every form of usual antiseptic, just as is his teacher, Boehler. Dakin solution has not been used for a long time. Freund, on the basis of experimental research, regards the use of the Chlumsky solution as a prophylactic, as absolutely injurious. Boehler has proved, on the basis of 17 open knee-joint injuries and 18 open elbow injuries, which he treated and cured only by débridement and primary capsule suture, that one does not need an antiseptic.

In the presence of joint injuries one should proceed in a purely surgical manner. The débridement should be carried out as soon as possible; however, this should not be done at the very front line but at the Classification Station. He discards joint resection both as a primary as well as a secondary procedure. This operation was carried out much too frequently in the previous wars. Thus, for example, in 1870 and 1871 this procedure was still carried out in 58.5 per cent of the cases. In reviewing the resections of the various wars of the previous century, Gurlt found a 35.5 per cent mortality, and in the war of 1871 there was a 39 per cent mortality. Tuffier gathered together 330 resections of the shoulder joint which were performed during the World War. Of the surviving patients 38 per cent had a flail joint. During the Spanish War resection of the shoulder joint was carried out very rarely. Vidal says that the primary joint resection should not be performed in the Classification Station. One should only remove the bone fragments which are loosened from the periosteum, exactly as in a fracture of the shoulder.

The author never performed exarticulations of the shoulder joint; these also are not indicated unless it should be in the presence of complete destruction of the joint associated with extensive soft-part injury and tearing of the artery.

For the purpose of transportation from the Classification Station, after first aid has been rendered, the best form of bandage is the plaster-of-Paris cast which retains the chest as well as the entire upper extremity and holds the latter in a position of abduction and anteversion. The ready-made abduction splint as well as the Cramer wire abduction splint are not suitable for this purpose. In this transportation cast the abduction angle should be only about 45 degrees, the forearm must be in a position of pronation, and the fingers should not be included in the cast. With this dressing the injured person should be transported directly to the special hospital, which ordinarily should be situated about 200 kilometers behind the lines. Intermediate stations can only cause harm because the primary cast can too frequently be removed and reapplied improperly, and various doctors might very likely undertake variable methods of treatment.

When the patient has arrived at the final base hospital x-ray pictures should be taken in 2 planes. The x-ray cassette should not be placed in the frontal plane but rather in the slightly oblique plane so that the central ray is tangentially directed toward the glenoid fossa. A great many films were used. It was only after the x-rays were taken that windows were cut in the plaster cast and treatment of the wound was instituted. Penetrating missiles were then re-

moved only if they lay free in the joint and had not lodged in the bone. For this purpose the author employed the anterior incision in the deltoid pectoral space. In the cases having an aseptic course the plaster cast was removed early and the arm was placed upon an abduction splint made of Cramer splints in order to allow the beginning of functional therapy as soon as possible.

In the infected cases, which amounted to 72 per cent, 3 basic procedures were followed: uninterrupted fixation in abduction and anteversion, good drainage, and open wound treatment without dressings. During the Spanish War the occlusive method of treatment was also frequently used. Frusta obtained excellent results with this method. However, his patients were civilians injured in bombing raids who could be brought to the hospital in a comparatively short time. However, Vidal regards this method of treatment for the war wounded seen in the first front line stations as improper. Later on, however, when the infection has subsided he believes this treatment may be an excellent one. This also applies to the cases of minor osteitis after sequestrotomy. In all other cases, treatment by absolute fixation and without bandaging of the wound is preferred. Aspiration of the joint comes into question only in cases of empyema; in phlegmon of the capsule only very little or no pus is obtained. Aspiration of the joint is performed by the author at the posterior end of the achromium between the outer margin of the deltoid and the tendon of the infraspinatus. In most cases of joint empyemas, aspiration of the joint suffices. In phlegmon of the capsule, arthrotomy must be performed. Vidal, in agreement with Payr, prefers posterior arthrotomy because of the better drainage. The arthrotomy wound is not drained by rubber tubes but rather by strips of rubber dam. All of these procedures, however, are carried out while the joint is at rest in a chest-arm plaster cast or upon an abduction splint.

The author then devotes an entire chapter to secondary resection of the joint, a procedure which he, as a pupil of the Viennese school, completely rejects because of its poor end-results. This procedure is not necessary for the drainage of pus from the shoulder joint, and it also predisposes to the formation of a flail joint. Without resection the desired ankylosis usually occurs within three months, whereas with resection it may occur much later or not at all. The author's successful results attest the correctness of his therapy. His results showed that in 23 cases of phlegmon of the capsule, not 1 patient died.

AFTER-TREATMENT

In aseptic cases the abduction splint is removed after from four to six weeks, provided that the wounds are healed; in infected cases functional therapy may be started even if the wounds have not healed, provided that bony ankylosis has been attained. Vidal demonstrates, by means of illustrations and pictures, what results may be obtained in aseptic and ankylosed joints by means of a good after-treatment. In 36 per cent normal motion and in 30 per cent a mild limitation of mobility was obtained; in the latter cases, however, the arm could always be brought to the horizontal plane. In contradistinction to these results, Erlacher was able to demonstrate a normal mobility in only 5 of 284 cases of gunshot wound of the shoulder joint which occurred during the World War. With reference to the ankylosis, all observers agree that the best position is abduction of 40 degrees and light, moderate anteversion. However, these authors are by no means uniform in their opinion as to the method of fixation and attainment of the desired angle for ankylosis. Bastos and Arguelles are of the opinion that placing the arm in a midposition is equivalent to an abduction of 45 degrees. This conception, however, is not correct according to the findings of Boehler. The mid-position of the arm is equivalent to an abduction of 90 degrees and an anteversion of 40 degrees. This position is similar to a double right-angle splint. The abduction is always attained for two-thirds of its course through the mobility of the scapulohumeral joint and for its other one-third through turning of the scapula. For this reason they always fix all of the cases of gunshot wounds of the shoulder joint, including the aseptic ones, at an angle of 90 degrees abduction and 40 degrees anteversion when the first treatment is given in the secondary war medical stations, and thus, with this method of treatment, an ankylosis at an angle of from 40 to 50 degrees is obtained in the infected cases in which an ankylosis is desirable. With this form of ankylosis the patient is able to raise his arm to the horizontal plane. The author repeatedly emphasizes the importance of the position of anteversion as introduced by Boehler. In the 14 cases of old injuries of the shoulder joint Vidal occasionally found adduction contractures, resulting from improper treatment, which were very difficult to overcome. Furthermore he was against the too early removal of sequestra. One should wait at least four months.

In conclusion, he touches upon the shoulder-joint arthrodeses, by means of which one can obtain good functional results. He also presents a series of statistics. While the mortality during the American Civil War still amounted to 30 per cent, that of the War of 1870 and 1871 to 34.6 per cent, and that of the World War from 3.5 to 5.08 per cent, Arguelles, who also used the Boehler technique and treated a total of 89 injuries of gunshot wounds of the shoulder joint, did not have a single mortality. Whereas in the World War, Tuffier saw flail joints in 38 per cent, Erlacher in 16 per cent, and Boehler in 3.5 per cent, these two authors had none. As far as the mobility is concerned, Erlacher, during the World War, saw a marked limitation of motion under 90 degrees in 36 per cent of the cases; these authors saw none; limitation of more than 90 per cent was seen by Erlacher in 2 per cent, by Boehler in 39.5 per cent, and by Vidal in 30 per cent. Normal mobility was found by Erlacher in 1.5 per cent, by Boehler in 18.5

per cent, and by Vidal in 36 per cent. Several tables and 28 illustrations are included in the article.

(FRANZ). HARRY A. SALZMANN, M.D.

Jimeno-Vidal, F.: Gunshot Fracture of the Clavicle. Experiences from the Spanish War (Schleusselbeinschussbrueche. Erfahrungen aus dem spanischen Krieg). *Arch. f. orthop. u. Unfall.-Chir.*, 1940, 40: 586.

Most text books on war surgery stress the infrequency of the isolated gunshot fracture of the clavicle. Vidal has treated only 30 such cases in his own military hospital. Only 3 patients had a lung injury at the same time, and 3 had neuroparalysis (2 of the plexus, 1 of the median nerve). In his military hospital these fractures amounted to 1 per cent of all the gunshot fractures of the upper limbs. Arguelles observed that they occurred in 0.9 per cent of 532 fractures of the upper limbs. There were 17 badly infected gunshot wounds, and 13 comminuted fractures. The outer one-third was involved 19 times, the middle third 10 times, and the inner third once. The lungs are most often involved in wounds of the inner third. After extirpation in the Klassification hospital, gunshot wounds of the clavicle are transportable if they are not further complicated by lung injury. Two of the author's cases had a clean hemothorax; the third had, in addition, a suppurating inflammation of the skin of the breast.

In general the wounds were small. Large wounds of the soft parts are nearly always complicated by wounds of the large blood vessels and the patients bleed to death on the battle field. Among these patients there were no wounds greater than a five-mark piece. Healing by granulation occurred in 56.5 per cent. In 13 cases, 43.4 per cent, suppuration occurred, and in 2 osteitis with sequestration. There was no gangrene and no thrombophlebitis. Healing followed in four weeks. A temporary dressing was applied, a cushion was placed in the axilla, and a circular bandage around the arm and breast.

In the emergency hospital, primary surgery of the wound was performed if necessary. The wound was left open and no sutures were used. Open wound treatment and wooden splint (Boehler) were used; only occasionally was splinting done in abduction. All splintings with immobilization in adduction are to be condemned. Suppuration occurred in 13 cases, but was of no significance in 8. Abscess formation requiring incision occurred only 3 times. Vidal reports very good functional results, namely, 90 per cent normal mobility and serviceability. Five illustrations accompany the original article.

(FRANZ). MARIAN BARNES, M.D.

Moore, P. L., and Bracher, A. N.: March Fracture: Report of 3 Cases. *War Medicine*, 1941, 1: 50.

Three cases of march fracture were seen within a period of two months in a camp where 15,000 regular troops are stationed. In 2 cases the fracture followed the participation in athletics; 1 followed a night march.

The symptoms were not insidious but came on at a definite time and period of activity accompanied with sudden, almost disabling pain.

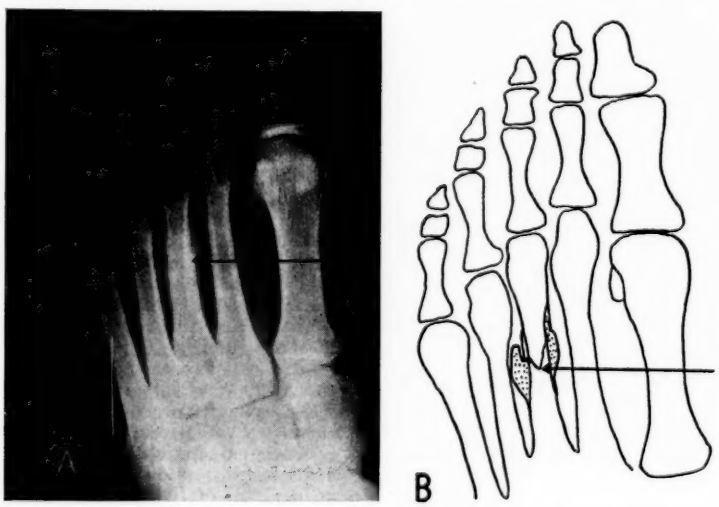

Fig. 1. *A*, Roentgenogram taken twenty-five days after the onset of symptoms, showing a definite fracture line with callus formation. The arrow indicates the fracture. *B*, Drawing made from the roentgenogram. The arrow indicates the fracture; the stippled area, the callus.

Edema on the dorsum of the foot begins approximately twelve hours after the onset of pain. Pressure over the involved metatarsal bone causes intense discomfort. The patient walks with a noticeable limp. An area of erythema over the fracture site may be present but the pain is not so severe as to be incapacitating.

The fracture may be overlooked in the roentgenogram until callus formation is present. The fracture occurs in the second to fourth metatarsal bones and in cases of metatarsalgia x-ray examination is indicated. GEORGE A. COLLETT, M.D.

Caldwell, G. A.: New Developments in the Treatment of Compound Fractures. *Ann. Surg.*, 1941, 113: 705.

The possibility of participation in hostilities, as well as the ever-increasing number of traffic and industrial accidents, has renewed interest in the treatment of compound fractures. Basic principles of treatment remain unaltered. Various modifications of details have been made during the past two or three years, some of them fundamentally sound. Many others, however, based on unreliable statistics, are misleading.

The statistics offered as evidence of the value of roentgenotherapy and chemotherapy in treating the complications of gas gangrene, without indicating whether or not surgical measures were employed concomitantly with these procedures, have left us in doubt as to their value.

Improved methods of estimating the degree of shock and loss of body fluids, together with more prompt and efficient treatment, make possible earlier débridement of compound fractures. The incidence of infections can, therefore, be diminished.

Tetanus antitoxin, as a preventive measure, will probably disappear as more of the military and civil population are immunized with tetanus toxoid.

Extensive preparation of the skin and wound with soap and water could be replaced by ether or iodine. Immobilization of the fractured parts by traction during the stages of preparation and operation is desirable. Implantation of sulfanilamide crystals in compound wounds is a valuable adjunct in preventing infection. Animal experimentation indicates that sulfanilamide has relatively little effect upon the progress of gas gangrene in closed wounds infected with clostridium welchii.

Internal fixation of fragments followed by closure is safe only in carefully selected cases operated upon by competent surgeons who possess a good armamentarium of instruments and equipment. Postoperative fixation of open fractures in closed plaster encasements is objectionable and unnecessary. Adequate fixation which permits careful dressing can always be devised. Sulfathiazole in pectin jelly forms an ideal bland substance for dressing these wounds—it eliminates the odors, reduces the amount of discharge, and hastens healing.

The complication of gas gangrene can be recognized before it is revealed roentgenologically. The treatment is essentially surgical, with the use of sulfanilamide and antitoxin as adjuncts. Roentgenotherapy alone has not yet proved its usefulness as a measure for arresting the progress of gas gangrene. Experimental work suggests that it has some inhibitory action under certain conditions.

SAMUEL H. KLEIN, M.D.

Bandeira de Mello, N.: The Transport of Patients and the Wounded by Air (Die Ueberfuehrung von Kranken und Verwundeten auf dem Luftwege). *Rev. Med. mil.*, 1940, 29: 174.

The author discusses briefly the experiences collected up to the present time in the transport of wounded persons with aeroplanes in the Paraguay-Bolivian War, in the present European War (Polish War), and in the Spanish Civil War. Every three-motored transport plane can be prepared for this purpose; it should be supplied with the sign of neutrality and fitted up with 8 stretchers, which are hung on supports with leather straps, and the space for the purpose of applying dressings or injections to the patient should be sufficiently large. Naturally, dressing material, splints, and drugs must be carried along in sufficient amounts. The inclusion of 3 or more aeroplanes into a Sanitary Air Formation of great mobility is advisable. In this way 72 lying and 18 sitting patients can be transported by 3 daily flights. The aeroplane is the most comfortable, quickest, and safest means of transport for wounded and sick patients. The disadvantages consist mainly of the difficulty of transport to the aeroplane, which requires a suitable landing place, and of transport to the hospital after the landing.

With lying patients, vomiting is disregarded; air sickness and the lack of oxygen can be avoided by careful flying, not higher than 1,200 meters. The indications for and contraindications against transport by aeroplane are discussed briefly and the following conclusions are drawn:

1. The Sanitation Department of the mobile army should have at its disposal a Sanitary Flying Formation of 3 aeroplanes for the quick transport of the wounded and of patients from the Dressing Stations and Field Hospitals to the rear.

2. The aeroplane should be a three-motored transport plane suitably furnished for 8 lying and 2 sitting patients; a military surgeon should attend.

3. The demand for the aeroplane should proceed from the Army-Sanitary-Chief at the Dressing Station or Field Hospital with a report of the probable number of patients and their location.

4. The flying should not be done at a higher distance than 1,200 meters and in the quietest possible air layers.

5. Patients in a condition of shock or of threatening collapse must not be transported. Patients recently operated upon, or with gunshot wounds of the lung, severe anemias, and pneumonias can be transported only under special precautions and after weighing the advantages and disadvantages.

(STRAKOSCH). LOUIS NEUWELT, M.D.

Ernst, M.: The Preparation of the Wounded for Transport from Aid Stations Close to the Combat Zones (Ueber die Vorbereitung der Verwundeten zum Abtransport aus dem frontnahen Lazarett.) *Muenchen. med. Wchnschr.*, 1940, 2: 1377.

The author describes several rules to be followed in the preparation of the injured for transport from field hospitals. Being confronted with a great variability of the clinical picture, the physician must meet the special requirements of each case, but the following general rules may be observed:

The patient's clothing may be used for protection from exposure. Anemia should be combated by blood transfusion; however, it is difficult always to find a sufficient number of blood donors, and methods of preserving blood have not yet been sufficiently perfected for practical use. The administration of excessive amounts of fluid per os should be avoided because it easily produces vomiting. Dressings should cover the wounded parts completely and, in addition, the injured extremity should be immobilized. For this purpose large plaster-of-Paris longuettes are suitable because they can be applied without difficulty. A proper inscription on the dressings should indicate the site and location of the wounds and the type of bone injuries. In cerebral injuries intravenous injections of 50 per cent glucose solution are beneficial. Injuries of the chest or abdomen require special attention. The patients in such cases should be transported only when their condition is no longer dangerous. Difficulties in urination call for a retention catheter.

(Braun). Joseph K. Narat, M.D.

Jimeno-Vidal, F.: Isolation Hospitals for Gunshot Fractures. Experiences Derived from the Spanish War (Sonderlazarette fuer Knochenschussbrueche. Erfahrungen aus dem spanischen Krieg). *Deutsche Mil. arzt*, 1940, 5: 529.

The author emphasizes the frequency of gunshot wounds of the extremities, and particularly of gunshot fractures of bones. The German medical report revealed 63.6 per cent gunshot wounds of the extremities, and of all the wounded, 25.7 per cent suffered gunshot fractures of the bones. Kirschner computed that 85 per cent of all severely wounded persons and 92 per cent of the surviving gravely wounded suffered gunshot fractures. Pertinently, the military surgeon must be taught the management of this type of injury. However, equally as essential to the attainment of good results is a uniform organization. The key points are quick transport to the principal dressing station, such as a field hospital where the first surgical preparation is made; and then transportation, in a plaster-of-Paris cast, farther back to an isolation hospital where the wounded can remain until healing has finally been completed. The patient needs to traverse only three stations: (1) the first aid station for the most severely wounded or for the entire troop; (2) the classification unit (field hospital or principal dressing station) where work has been done under really peaceful conditions; and (3) the isolation hospital conducted under the guidance of an accident surgeon. The accustomed procedure of transporting the wounded from medical station to medical station with changing of dressings, to eight or ten stations, until a final favorable resting place is found is objectionable. The wounded should not return from the classification hospital over the military road but directly radially into a separate isolation hospital. If this is not done it means that the patient may arrive at an overfilled hospital, be rejected, and must of necessity be transported further; or it may happen that other patients in the overfilled hospital, many with gunshot fractures, must be moved out before they are healed in order to make room for new-comers. Twelve very impressive pictures reveal the unsatisfactory healing of femoral fractures of the wounded who had to wander through the various hospitals; and are compared with those of patients who from the very beginning could be treated in an isolation hospital. The isolation hospital must be erected at a safe distance from the scene of battle, and quite outside of the cities. The patient should not have to be moved at each air-raid alarm into an air-raid shelter. The optimum distance for the isolation hospital should be approximately 200 kilometers. The Spaniards had three such hospitals, and the organization became so good that gunshot fractures obtained surgical attention within twelve hours. The isolation hospital was reached in peaceful times in nine hours, and after the most severe battles in two or three days; the patients at times arrived by rail transport as early as six or seven hours after injury.

A short transport of this nature can be accomplished with limited danger for every gunshot fracture provided that the patient is supported well surgically, and receives a good plaster-of-Paris dressing for the purpose of facilitating transportation; the results are attested by the author's 7,000 cases. The author does not agree with Franz who admits that the plaster-of-Paris bandage is the ideal dressing for transportation, but considers it impractical because water, material, and time are often wanting. The plaster-of-Paris dressing naturally does not come into question for the first transport to the classification hospital. The Cramer splint dressing was used, for the most part, in Spain. However, water is necessarily available at the classification hospital, and the material also presents no difficulty: plaster-of-Paris is less cumbersome than splints. Time yields to continued practice. The Spanish surgeons, with two physicians assisting, were able to apply from 70 to 80 plaster-of-Paris dressings daily in the afternoon. This essentially involves training in the use of plaster-of-Paris but the Spanish physicians soon acquired the faculty. Circulatory disturbances were never seen even with the application of a non-upholstered plaster-of-Paris dressing, according to Koehler. Splints must necessarily be used during the course of transportation. After the application of the plaster-of-Paris bandage, the patient should be

able to move his fingers or toes. Should this not be possible the attendants must be notified. The advantage of the isolation hospital is in its similarity of treatment and equipment. At times, 130 gunshot fractures of the femur were in continuous traction. The isolation hospital must be large (from 600 to 1,000 beds). The after-care should also be conducted there. If there was no place for this, the author sent the patients to their homes on a leave of absence, after a certain period of time; plaster-of-Paris dressings were applied, and instruction given to exercise as diligently as possible. He obtained better results by such practice when the patients received regular physical therapy and massage at the hospital.

(Franz). H. H. Groskloss, M.D.

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Blalock, A., and Mason, M. F.: A Comparison of the Effects of Heat and Those of Cold in the Prevention and Treatment of Shock. *Arch. Surg.*, 1941, 42: 1054.

The effects of causing rather marked elevations or depressions of the body temperature of animals in shock as a result of hemorrhage or trauma have been determined. Significant elevations of temperature decrease the chance of life and shorten the period of survival. The application of cold does not increase the chance of survival but is accompanied by a lengthening of the survival of an animal with a low blood pressure. Significant elevations of temperature cause more disastrous effects than do depressions of a similar degree. Samuel H. Klein, M.D.

Strumia, M. M., and McGraw, J. J.: Frozen and Dried Plasma for Civil and Military Use. *J. Am. M. Ass.*, 1941, 116: 2378.

Experimental and clinical observations have established the value of plasma as a substitute for blood. Properly prepared plasma offers the following advantages according to the authors:

1. There is freedom from reaction except for an occasional urticaria.
2. The doses given may be repeated.
3. The plasma can be concentrated.
4. Plasma does not add to hemoconcentration.

These advantages have led to a decrease in the number of whole-blood transfusions and an increase in the use of plasma during the past three years at the Bryn Mawr Hospital. This is graphically shown.

The indications for plasma and/or whole-blood transfusions are tabulated. In the treatment of shock, burns, hypoproteinemias, and cerebral edema, plasma is to be preferred. A supplementary whole-blood transfusion is urged in shock complicated by hemorrhage. In burns, according to the author, whole-blood transfusion is contraindicated if plasma is available. Acute poisonings, anemias, and blood dyscrasias in which the hemorrhagic tendencies predominate call for whole blood transfusions. In the treatment of infections plasma is to be supplemented by transfusions if anemia is present. The limitations of whole-blood transfusions are:

1. Safe storage is of short duration.
2. Transportation for long distances requires refrigeration and the use of heavy and bulky apparatus.
3. Before administration, whole blood needs to be typed and cross-matched.
4. Stored whole blood needs filtration before administration.

The advantages of plasma lie in these facts:

1. It may be kept for indefinite periods of time.
2. It is easy to transport.
3. There is no necessity for typing.
4. Proper preservation (frozen or dried) prevents fibrin precipitation.

The authors point out that the question of the use of plasma versus serum has been unduly magnified; however, they prefer plasma to serum for the following reasons:

1. There is a greater yield by centrifugation.
2. Production may be coordinated with the function of the blood bank.
3. Reactions to plasma are fewer.

A marked disadvantage of citrated plasma is the difficulty of filtration through Seitz or similar filters. The authors believe that filtration is unnecessary if a closed system is involved. (The U. S. Institute of Health recommends filtration.) The annoying formation of fibrin and the separation of other globulins in precipitate form may be avoided by rapid fixation of the fibrinogen as well as of the other labile elements by freezing immediately after the separation and pooling, followed or not by drying from the frozen state.

The preservation and storage of plasma in the liquid state at 4° C. has been abandoned at the Bryn Mawr Hospital despite the fact that this type of material had been used since 1931. The reason which led to this decision was contamination. The authors report 5 severe pyrogenic reactions. Merthiolate 1/10,000 has been used and had been added after pooling but no bacteriological studies were made. All plasma should pass a two weeks' negative aerobic and anaerobic culture. From the plasma given to patient No. 4, large numbers of gram-positive bacilli, approximately 1 to 3 microns in size, without spores and square-ended were found. On account of this experience, together with the deterioration with loss of prothrombin, complement, and fibrinogen, the storage in liquid state is considered undesirable.

In 1932, it was noted that the more labile properties of plasma could be effectively preserved in the frozen state. The demonstrated advantages of this material are:

1. Ease in preparation.
2. Economy.
3. Ease of storage and transportation because of wide temperature range as long as the material is kept frozen.
4. Preservation of the labile elements.
5. No need of the addition of water before administration.

6. No need for filtration before administration. (This last claim is questionable because of the separation of particulate matter when the plasma is thawed.)

The technical points for freezing are: (1) rapid freezing (not more than from three to six hours), (2) maintenance in the frozen state, (3) rapid thawing at 37° C. in a water bath or at room temperature (twenty-five minutes). The majority of plasma at the Bryn Mawr Hospital is kept in this condition.

Dried plasma. The advantages of dried plasma are: (1) it can be preserved and transported under all conditions; (2) it can be rapidly regenerated with distilled water; and (3) it may be concentrated. From their long experience the authors warn that the proper drying of plasma is at best a difficult and expensive procedure. The legitimate field of usefulness of dried plasma is in cases of adverse conditions of storage and transportation. The routine use of concentrated plasma in the treatment of shock is considered unjustified.

Units for the preparation of plasma. Medical institutions of sufficient size should be provided with means for the collection of blood, the separation, pooling, and freezing of plasma, and a means of maintaining plasma in the frozen state. Ninety per cent of the institution's needs for plasma can thus be met. For the need of dried plasma a small apparatus or a cooperative scheme is suggested. This entails the establishment of "drying units." The material to be dried could be transported as fresh citrated whole blood. A National Preparedness program and the supply of plasma are outlined.

EDWIN J. PULASKI, M.D.

Miglietta M.: Anesthesia of the Stellate Ganglion in the Treatment of Postoperative Pulmonary Complications (L'anestesia del ganglio stellato nel trattamento delle complicazioni bronco-polmonari post-operatorie). *Arch. ital. di chir.*, 1940, 58: 548.

Postoperative bronchopulmonary complications are still serious matters for debate and controversy in spite of the great advances in surgical technique during the past few decades. These complications occur after local or general anesthesia. Theories of their pathogenesis have shifted from the types of anesthesia to operative trauma. Abdominal surgery offers the greatest incidence of these complications as compared to other types of surgery (10 per cent to 3 per cent). In abdominal surgery the greatest incidence of pulmonary complications occurs after work in the upper quadrants of the abdomen; according to Hartmann and Murad gastric surgery has an incidence of from 15 to 20 per cent of pulmonary complications, while biliary surgery has from 12 to 14 per cent. Surprisingly, pulmonary surgery is very rarely followed by these complications.

The author discusses the prevalent theories as to the pathogenesis of postoperative bronchopneumonias. He mentions the possibility of bacterial emboli as demonstrated by Seifert. The rhinopharynx is mentioned as a source of bacterial contamination. A local predisposition is necessary for the full development of the condition. According to American authors such as Elwin and Coryllos, the chief local condition that predisposes to bronchopneumonia is atelectasis. This is the prevalent theory today for the explanation of the pathogenesis of postoperative bronchopneumonia. According to these authors, atelectasis occurs regardless of whether the anesthesia used is general, local, or spinal. Only x-ray examination can demonstrate this condition very early; clinical examination is usually negative at the early stage of the process. The duration of the atelectasis varies. It may go on to a sudden resolution or to a fatal termination.

The author continues with a review of the literature which attempts to explain the mode of origin of this atelectasis. The causes mentioned include diminished pulmonary capacity, hypoventilation of the lungs, mechanical obstruction of the bronchi by plugs of mucus (Coryllos); vasomotor disturbances which produce a marked vasodilatation in the alveoli; and reflex disturbances in the sympathetic nervous system induced by operative manipulations in the abdomen and which cause reflex pulmonary changes. The author then gives a detailed description of the parasympathetic and sympathetic innervation of the lungs. He points out the importance of the stellate ganglion of the cervical chain where many of these fibers seem to run together. Many authors have demonstrated experimentally the existence of reflex pulmonary changes when the abdominal viscera are manipulated. Crile, Mummery, and others have demonstrated that postoperative bronchopneumonia is directly correlated with surgical trauma. Miglietta believes that these reflex disturbances are carried through the sympathetic nervous system. Since most of the nerve fibers come through the stellate ganglion, he believes that these disturbing reflexes may be controlled by local anesthesia of this ganglion. He uses the technique of Leriche for this procedure, which is illustrated with several technical drawings. In this method 10 c.cm. of 1 per cent novocaine are injected about the stellate ganglion on the affected side. The procedure has its dangers, namely, the possibility of puncturing the subclavian artery, the vertebral artery, or the apex of the lung; however, with proper technique these dangers are avoided.

Miglietta reports his experiences with this method in the treatment of 13 cases of postoperative pulmonary complications. The stellate ganglion on the affected side was treated with novocaine; when both sides were involved the treatment was given on the side that seemed most involved in the process. Favorable results were observed in the temperature and clinical behavior; recovery occurred in 11 of the 13 cases. No improvement was obtained in 2 cases and the patients died in a few days; one seemed to have multiple pulmonary emboli with myocardial weakening, and the other had an atypical late development of pulmonary complications with an accumulation of pleural fluid which was found on

thoracentesis (this case acted more like a serious pulmonary infection than a reflex lung reaction).

The author concludes that his experiences tend to confirm the theory that sympathetic nerve disturbances are the cause of postoperative bronchopulmonary complications. JACOB E. KLEIN, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Homans, J.: Minor Causalgia Following Injuries and Wounds. *Ann. Surg.*, 1941, 113: 932.

Causalgia in its major form, seen chiefly in war, is well recognized, but its minor form is looked upon by most surgeons as something freakish, hysterical, or as an exhibition of malingering. Serious causalgias are apt to follow wounds of certain great nerves. The brachial plexus and the median and sciatic nerves are chiefly susceptible. The syndrome takes the form of a disabled extremity, reddened and glossy, edematous, cool rather than hot, subject to a peculiar burning pain, sore to the touch, intolerant of dryness, and intensely sensitive to drafts and jars. The bones are atrophied. The muscles are or seem to be partly paralyzed. These great nerves are susceptible because of their rich supply of blood vessels which, in turn, are abundantly furnished with vasomotor nerves. Apparently, it is through an irritation of these tiny nerves that the secondary changes of causalgia occur, but that such nerves are strictly of a vasomotor nature is doubtful. They are more likely to be related to the sensitivity of the blood vessels, and to carry centrally headed impulses which enter the spinal cord by way of the posterior roots. Causalgia may thus be pictured as a vicious reflex which excites, through local connections in the cord, a combined sensory and vasomotor dysfunction.

Related to the serious causalgias are traumatic edema and osteoporosis, Sudeck's atrophy of bone, reflex dystrophy of the extremities, and chronic segmental arterial spasm. These differ from the syndrome described in being excited, not by trauma to the large nerves and vessels, but by a great variety of lesser injuries, blows, crushes, fractures, minor wounds, and especially punctures such as are made by splinters, thorns, and bites of animals. It is of interest that they arise from the inflammatory, obstructive form of thrombophlebitis also, doubtless because the nerves surrounding the vessels are caught in the inflammation. The changes in minor causalgia include atrophy of bone, disorders of joints, edema, paresthesia and vasomotor dysfunction, which usually leave a cool, smooth, bluish skin, but occasionally vasodilatation. All these may appear together or in various combinations, a sensory-sympathetic disorder which may even spill over to the motor side. Sometimes a minor causalgia is overlaid by a hysterical glove anesthesia, but most of the patients wish to recover and return to work, and take their plight hard.

The basic feature of all causalgias is pain. The condition has been described as the "posttraumatic pain syndrome." However difficult it is to account for the pathological physiology of causalgic pain, it is certain that it depends upon a very unstable reflex, one which can often be broken up almost as easily as it has been established. If its pathway is temporarily interrupted, on many occasions if necessary, it may disappear forever.

In the treatment of the condition, the author prefers sympathetic block, although periarterial sympathectomy and lumbar or upper thoracic sympathectomy are also used successfully.

SAMUEL KAHN, M.D.

ANESTHESIA

Pinotti, O., and Baccaglini, G.: Changes in the Dynamics of the Circulation in the Course of Ether Narcosis and Spinal Anesthesia (Modificazione della dinamica circolatoria nel corso della narcosi eterea e della anestesia spinale). *Arch. ital. di chir.*, 1940, 58: 448.

The author studied the dynamics of the circulatory functions in patients under ether narcosis and spinal anesthesia. He used physiological sphygmomanometric methods to measure such factors as arterial pressure, pulse volume, minute volume, coefficient of arterial elasticity, total peripheral resistance, velocity of propagation of the pulse wave, and the elastic reserve. He presents two tables of detailed data on each group of patients (15 in the ether group and 16 in the spinal anesthesia series). He stresses particularly the importance of the coefficient of arterial elasticity, noting that the aorta and the large arteries are not only elastic but also have a contractile function due to their smooth muscle fibers. The body thus has the power to normalize arterial pressure in accordance with volume flow and peripheral resistance.

The author found that in ether narcosis the arterial pressure was normal or slightly elevated, the pulse frequency was increased, and the cardiac volume increased by 50 per cent. The peripheral resistance was diminished.

In spinal anesthesia the arterial pressure was decreased to the lower limits of normal and the cardiac volume flow as well as the peripheral resistance was diminished. The arterial elasticity was either normal or slightly increased. In brief, the circulatory changes in spinal anesthesia are similar to those found in peripheral collapse. This is best treated with vasoconstrictors. JACOB E. KLEIN, M.D.

Smelovski, V.: A Case of Arteriovenous Aneurysm of the Renal Artery Following the Lumbar Novocaine Block of Wischniewsky (Ein Fall von arterio-venoesem Aneurysma der Nierenarterie nach einer lumbalen Novocainblockade nach Wischniewsky). *Chirurgija*, 1940, 8: 142.

The pararenal novocaine block of Wischniewsky was performed on a patient with decompensated mitral disease. Immediately after the injection there developed a severe general reaction with vomiting,

violent pain in the right abdomen, muscular rigidity, pulse acceleration, and fever. Three months after the injection an aneurysm could be demonstrated without doubt. It can be assumed with certainty that the aneurysm developed as a result of injury to the renal artery at the time of the injection, and that the initially observed infiltration in the region of the kidney was a hematoma.

(W. Plath). John L. Lindquist, M.D.

Paramonoff, V. A.: Anesthesia with Injections of Ether and Oil According to Toptschibascheff's Method. *Nov. khir. arkh.*, 1940, 47: 123.

Toptschibascheff introduced a new method of anesthesia employing subcutaneous injections of a mixture of two parts of ether and one part of oil. He uses 1 c.cm. of ether per kgm. of body weight. The introduction of the anesthetic mixture is preceded by an injection of from 5 to 10 c.cm. of a 0.5 per cent solution of novocaine. Not more than from 15 to 20 c.cm. of the mixture are introduced at one point. Anesthesia usually develops in five to fifteen minutes after the last injection. If at that time no anesthetic effect is yet noticed, an additional 15 c.cm. of the mixture are injected at another place.

According to the originator of the method, the patients react only to the first injection, hardly remember the second, and show a complete amnesia in regard to the third and fourth. There is no interference with respiration. Toptschibascheff maintains that his method furnishes a rapid effect in the form of a deep sleep and complete analgesia, without asphyxia or postoperative pneumonia. Among 380 cases abscesses developed in only 5.

The author tested the method in 11 cases. In 10 neither sleep nor analgesia could be obtained and the patients remained awake one hour and ten minutes after an introduction of as large an amount as 160 c.cm. of the mixture. In 2 cases abscesses developed, in one neuritis occurred, and in another the skin at the site of the injection became necrotic.

The author concludes that Toptschibascheff's method is not suitable for field surgery.

Joseph K. Narat, M.D.

Williams, A. C., and Marcus, P. S.: The Choice of Anesthesia in Ludwig's Angina. *Anes. & Anal.*, 1941, 20: 160.

The authors desire to bring about a better understanding of the anesthetic and surgical problems met with in the treatment of Ludwig's angina. Their study is based on 25 cases. While the clinical, pathological, and surgical aspects of Ludwig's angina have been well presented in the American literature, there are but fragmentary comments to be found concerning the anesthetics employed. No recognition seems to have been given the fact that without complete co-operation between a thoroughly capable surgeon and an equally capable anesthesiologist, adequate surgery is possible only under great difficulties and with considerable operative risk. This is partly due to the fact that Ludwig's angina is a highly dangerous disease even under the most favorable conditions. Surgical procedure must go on under a particularly complicated set of conditions. Besides this, the very limited choice of anesthetic agents and methods of administration which were possible up to ten years ago complicated the situation still more.

It is only now that the science of anesthesiology is coming into its own. With a wider range of anesthetic agents and better methods of administration, we may look forward to a considerable improvement in operative results. A recent study of 31 cases of Ludwig's angina reports a mortality rate of 54 per cent.

This high mortality rate has been responsible for the present article in which Ludwig's angina is discussed from the standpoint of the anesthetist. Anesthesia of sufficient depth and duration is required to permit a deep and generous incision of the inframandibular region of the neck. Since partial respiratory obstruction is one of the cardinal features of this disease, maintenance of a patent airway immediately looms as the anesthetist's chief difficulty.

Local anesthesia has been advocated by some practitioners on the ground that the patients under consideration are generally in too poor physical condition to tolerate general anesthesia. Contrary to this opinion, however, it appears that general anesthesia can be well tolerated provided a proper airway be maintained.

As to the choice of anesthetic agents, inhalation agents have little to recommend them beyond the fact that sufficient anesthesia can be produced to permit of extensive surgery. Beyond that the disadvantages attendant upon their use are considerable. In the first place, the anesthetist is in the surgeon's way. Moreover, some degree of spasm of the airway is produced by inhalation agents as evidenced by coughing and gagging during induction. Respiratory obstruction of sufficient degree to require tracheotomy frequently occurs with inhalation agents. The high incidence of obstruction together with the consequent difficulties of continuing anesthesia through the tracheotomy should be sufficient to rule out inhalation agents in this condition.

The authors report their experiences in 25 cases of Ludwig's angina with the use of barbiturates given intravenously. They consider these the agents of choice, since they are safest and most convenient for the patient, the surgeon, and the anesthetist. The barbiturates used were evipal and pentothal, which were administered fractionally. They offer a number of obvious advantages. First of all, the anesthetist is out of the surgeon's way. The airway may be utilized solely for the administration of oxygen in a condition in which oxygen is most essential. The induction is smooth and free from the struggling and gagging so common with inhalation agents. The depth of the anesthesia is easily and quickly controlled. The patient makes a quick recovery, free from nausea and vomiting. Should

tracheotomy become necessary at any time, an even level of anesthesia can be maintained throughout and the surgeon can proceed without further inconvenience.

The method of administering the barbiturates is outlined in considerable detail. The importance of being ready to perform a tracheotomy is stressed as a life-saving measure, regardless of the type of anesthesia employed, since respiratory obstruction arises in a certain number of cases regardless of what precautions are taken or the type of anesthesia that is used. The authors believe this to be a further indication for the intravenous administration of barbiturates for, even though respiratory obstruction should occur, the anesthesia can be continued evenly while the tracheotomy is completed. Recent studies on the harmful results of anesthesia anoxia serve to emphasize the importance and value of administering oxygen throughout the operative procedure. MATHIAS J. SEIFERT, M.D.

SURGICAL INSTRUMENTS AND APPARATUS

Hirshfeld, J. W., and Laube, P. J.: Surgical Masks. *Surgery*, 1941, 9: 720.

Surgeons have attempted to prevent contamination of wounds with bacteria of the nose and throat by the use of masks, since the suggestions of Mikulicz, and, most recently, by attempts to destroy the bacteria after they have left the upper respiratory passages through the use of bacteriocidal ultra-violet radiation. In the literature there is a great similarity of opinion that masks are of value. There is some discrepancy of opinion, however, as to which type of mask is the most valuable. Especially since the work of Wells on infection by droplet nuclei, which has changed the general concept of contagion, have the effects of masks been worthy of review from a bacteriological standpoint. The authors have, therefore, constructed an airtight cabinet into which the test subject places his head, and from which bacteriological studies can be carried out both by the Petrie-dish method, and by the bacteriological centrifuge devised by Wells. The air within this cabinet was sterilized by the use of ultra-violet radiation so as to eliminate the factor of adventitious bacterial contamination.

The tests were made with the subject breathing quietly without a mask for fifteen minutes; without a mask and talking; quiet breathing with a mask; and talking with a mask. A variety of masks were used, both the pervious gauze types and the cellucotton insert types, as well as the deflection types of masks containing cellophane or celluloid. The staphylococcus albus and aureus, micrococcus catarrhalis, streptococcus non-hemolyticus and viridans, diphtheroids, gram-positive aerobic bacilli, and other bacteria were recovered.

The authors found that quiet breathing without a mask resulted in but little contamination, while talking greatly increased it. A rather surprising finding was that masks increased the number of bacteria in certain instances in quiet breathing. Indirect contamination was increased in 69 per cent of the tests by the use of the masks in quiet breathing, while direct contamination was increased in 62 per cent. On the other hand, masks were able to reduce the number of bacterial colonies during talking to a reasonable level. Surgical masks reduced direct-spray contamination in 89 per cent of the tests. No significant differences were noted when the masks were worn from one to four hours preceding the tests. Industrial respirators were also tried, and they were found to be even more effective than the surgical masks in preventing contamination.

The clinical significance of these findings would suggest that talking in the operating room should be restricted. Surgical masks are not as efficient as industrial respirators probably because they fit more snugly to the face, but the latter possess the drawback of great discomfort.

WILLIAM C. BECK, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Westermark, N.: A Roentgenological Investigation of Traumatic Lung Changes from Blunt Violence to the Thorax. *Acta radiol.*, 1941, 22: 331.

Traumatic changes of the lung from blunt violence to the thorax may be produced by a direct lesion to the lung or pleura from a fractured bone which has been forced into the thorax. This may give rise to a pneumothorax or hemothorax or both, intermuscular and subcutaneous emphysema, interstitial or interalveolar hemorrhages, and interstitial emphysema. The latter may extend into the mediastinum and neck. The characteristic feature of these changes is that they always proceed directly from the local lesion in the lung.

Traumatic lung changes such as lacerations and hemorrhages due to blunt violence may also occur without a direct lesion to the lung or pleura or evidence of damage to the chest wall. The rationale of such effects and the pathological changes accompanying them are discussed at some length. At times rupture of the bronchi may lead to interstitial emphysema extending to the mediastinum or neck, or if the peripheral alveoli are ruptured a pneumothorax may arise. Embolism may also result from such injuries. Some of the changes may cause few or no clinical findings, but quite often they give rise to acute or chronic bronchitis, bronchiectasis, pneumonia, lung gangrene, pleurisy, or empyema, because of secondary infections from bacteria in the respiratory tract.

The early diagnosis of traumatic lung changes from blunt violence is important in order to prevent, if possible, or ameliorate later complications, or in order to establish their traumatic origin if insurance principles are involved. Roentgenology offers especially favorable means of making such diagnoses. Comparatively few cases of this nature have been reported in the roentgenographic literature, some of which are cited by the author. In order to study the incidence and the roentgen appearance of such changes he reviewed 124 such cases which came under his observation. Of these, 56 showed signs of fractured ribs; in 3 others there was evidence of a fractured sternum; and 1 revealed a fractured vertebra in the thoracic region. Roentgenographic changes were present in 94 cases, of which 52 showed signs of fracture. In by far the greatest number of cases the pulmonary changes were of a bilateral character even when fractures were present only on one side. The findings are classified according to whether they were probably caused by a direct lesion of the lung or pleura by a fractured bone or whether no such direct connection was demonstrable. They are described in detail and interpreted in terms of the various pathological processes previously mentioned. Various criteria for the differential diagnosis from coincident or pre-existing pulmonary lesions are given consideration.

The present investigation has shown that traumatic pulmonary changes arising through blunt violence to the thoracic wall could be verified by roentgenography immediately after the accident in 75.8 per cent of all the cases. Among the cases in which there was evidence of fracture of the chest roentgenographic lung changes were observed in 86.7 per cent, and among the cases with no such signs roentgenographic changes in the lung were found in 65.6 per cent. The pulmonary changes as evidenced by roentgenography cleared up after two or three weeks in 53.2 per cent of the cases. In these cases the changes generally gave rise to no symptoms and were of slight significance. In 46.8 per cent, more or less severe lung complications occurred, such as empyema, pneumonia, and bronchitis. Such complications generally occurred within a period of from four to fourteen days after the accident. As a rule the cases showed no clinical signs of pulmonary disease before some complication set in. ADOLPH HARTUNG, M.D.

Doub, H. P., and Jones, H. C.: The Roentgenological Diagnosis of Tumors of the Small Bowel. *Am. J. Digest. Dis.*, 1941, 8: 149.

The diagnosis of tumors of the small intestine is based on the correlation of the history, and physical and laboratory findings with the roentgen findings, especially by evaluating the degree of impairment of the bowel function.

The authors in discussing these tumors separate them under two major groups, benign and malignant, except in the jejuno-ileal segment where they are considered together.

Benign duodenal tumors. Of a series of 33 cases of histologically verified tumors of the small intestine 8 were benign; 3 of these occurred in the duodenum. Adenomas, myomas, and fibromas are the most common tumors, whereas aberrant pancreatic rests, hemangiomas, lipomas, enterocysts, and neuroblastomas are rare, and, because of lack of any specific clinical manifestation, are discovered accidentally.

The symptomatology as collected from the literature is dependent upon the mechanical disturbance produced on the bowel function which results in partial or total obstruction or intussusception. The patients are usually younger and the clinical course is usually longer than in malignant tumors. In the beginning the only clinical manifestation may be epigastric or right upper quadrant pain, which often is characterized by a periodicity suggesting duodenal ulcer. Later nausea and vomiting follow, and gradually increase in severity, as the degree of obstruction increases. Dehydration, alkalosis, prostration, and weight loss represent further signs of advanced functional disorder. Some patients suffer from

diarrhea alternating with constipation, and tarry stools may be noted. As a result of this the red-blood-cell count and hemoglobin may be reduced to 50 per cent of their normal values, a fact which is especially suggestive of myoma or malignancy.

Malignant duodenal tumors. The duodenum is more frequently involved by carcinoma than any other segment of the small bowel. As a rule it forms the site of 3 per cent of all malignancies of the gastro-intestinal tract. The ileum is next frequently involved and the jejunum least. There are 3 main forms assumed by carcinoma of the duodenum: (1) constricting, (2) infiltrating ulcerative, and (3) polypoid. The size of the tumors may vary from a few millimeters in diameter to the size of a grapefruit. Histologically, the tumors may be adenocarcinomas, or medullary, scirrhous, or colloid carcinomas, the first predominating.

In the authors' series of 25 malignant tumors of the small bowel, 13 were carcinomas of the duodenum; 15 per cent were located in the supra-ampullary and infra-ampullary portions, respectively, and 70 per cent in the peri-ampullary portion. The differential diagnosis includes carcinoma of the pylorus, duodenal ulcer, pyloric tumor herniating into the duodenum, cancer of the head of the pancreas, gastromesenteric ileus, duodenal dilatation due to adhesions, and acute gall-bladder disease.

Sarcoma of the duodenum may occur, but is very rare.

Roentgen findings in duodenal tumors. The roentgen findings in benign lesions differ very little from those seen in malignant lesions. Partial or complete obstruction may be encountered. If encroachment on the lumen is bilateral and symmetrical, and the obstruction is complete, the lower end of the barium column is conical and the bowel above is dilated. If the growth is unilateral, there is asymmetrical narrowing. Occasionally there is a filling defect suggesting an ulcer niche. There may be six-hour gastric retention.

TABLE I.—DIFFERENTIATION OF CARCINOMAS AND SARCOMAS

	Lymphoblastoma	Carcinoma
Age	Young, usually the fourth decade; may occur in infants	Attacks persons in cancer age, usually fifth or sixth decades
Location	Most common in lower ileum and cecum	Most common in stomach or rectum
Course of Disease	Rapid	Prolonged
Obstruction	Late or not at all	Commonly found
Laboratory Findings	Blood in the stools rare; rise in temperature in afternoon; anemia severe	Blood in stools common; no rise in afternoon temperature; anemia moderate
Gross Form	Large aneurysmal dilatation	Small annular constriction

Tumors of the jejuno-ileal segment. The symptoms of both benign and malignant tumors of the jejuno-ileal segment are similar. As a rule they are dominated by the manifestations of intestinal obstruction. Adenomas, myomas, and fibromas are the most common benign tumors, whereas the malignant tumors fall into two main categories: carcinomas and sarcomas. Raiford has tabulated the differentiating signs of the two latter as given below:

Carcinoid tumors. These tumors are found throughout the gastro-intestinal tract, most frequently in the appendix and small bowel. They originate from argentaffine cells of the normal intestinal mucosa and develop in the submucosal layer. Unless they lead to obstruction, there is nothing unusual about their pattern, so that diagnosis is very difficult.

T. LEUCUTIA, M.D.

RADIUM

Teahan, R. W.: The Treatment of Carcinoma of the Breast by Interstitial Irradiation. *Am. J. Roentgenol.*, 1941, 45: 567.

After a brief historical review of the interstitial radium treatment of carcinoma of the breast, and special consideration of the method of Keyms, the author presents his own similarly treated series of 68 cases since 1933.

The cases were divided into 5 groups, as follows:

Group I. Cases in which there was a lump in the breast, without palpable lymph nodes.

Group II. Cases with a lump, with palpable nodes in the axilla.

Group III. (a) Cases with a lump in the breast, with palpable nodes in the axilla and the supraclavicular area; (b) with a lump adherent to the skin or the chest wall; and (c) with a lump, with distant metastasis.

Group IV. Postoperative recurrences.

Group V. Cases given prophylactic irradiation.

The results obtained are shown in the following table:

TABLE II.—SUMMARY OF CASES

	Group I	Group II	Group III	Group IV	Group V	Total
No. of patients living and well	10	11	11	0	1	33
No. of patients who died of carcinoma	0	0	20	3	0	23
No. of patients who died of intercurrent disease	1	1	4	0	0	6
No. of patients who were killed in accidents	0	0	0	1	0	1
No. of patients who died under unknown circumstances	1	0	0	0	0	1
No. of patients living with carcinoma	0	1	3	0	0	4
	12	13	38	4	1	68

In Table II which appears in the original article all of the author's 68 cases are individually summarized.

The technique of procedure consisted in the implantation of two types of platinum radium needles: one type 44 mm. long and containing 2 mgm. of radium and the other 60 mm. long and containing 3 mgm. of radium, both being of 0.8 mm. wall thickness. It is desirable to have available for each patient about 12 of the 2 mgm. and 30 of the 3 mgm. needles.

The longer needles were implanted first around the primary focus and toward the axilla. They were placed parallel at a distance of 1.5 cm. from each other on a plane just beneath the tumor, as a rule, in two rows with the points slightly overlapping. The smaller needles were implanted in the intercostal spaces, near the insertion of the ribs, around the lower periphery of the breast, and in the infraclavicular and supraclavicular fossæ. The implantation was done under nitrous-oxide and oxygen anesthesia after preparation of the skin with iodine and Richardson's solution. The needles were threaded with flexible monel-metal wire, and these wires were tied together in groups before dressing was applied. The greatest number of needles used at one time was 59, and the greatest quantity of radium 134 mgm. The needles were left *in situ* for a period of from 120 to 313 hours and the total dose varied between 848 and 32,329 mgm.-hrs. In 9 cases the treatment was repeated.

After a discussion of the reaction, post-irradiation course, accidents, and complications, the author considers the following to be advantages of the interstitial radium treatment: (1) the breast or portion of it may be saved; (2) the risk of procedure is less than in radical operation; (3) the carcinoma may be destroyed in some inoperable cases; (4) the method may be used when radical operation is refused; and (5) the treatment may be repeated. The following are disadvantages; (1) homogeneous irradiation is impossible in bulky breasts and in axillæ; (2) a longer period of hospitalization and convalescence is required than in radical amputation; (3) radiation fibrosis often causes marked limitation of arm movement; (4) closer follow-up is necessary for the detection of recurrences; and (5) the retraction of the breast and telangiectasis of the skin may produce more disfigurement than an operative scar.

A bibliography of 49 articles is appended.

T. Leucutia, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Walker, G. F.: Injury and Internal Disease. *Brit. M. J.*, 1941, 1: 659.

The literature is briefly reviewed as regards the relation of injury to cancer, organic nervous disease, myocardial and pericardial lesions, diabetes, tuberculosis, leucemia, appendicitis, peptic ulcer, pneumonia, and syphilis. Mental after-effects of head injury and injury to bones and joints are also reviewed. Various case records reported in the literature are mentioned. The bibliography is of interest.

The author points out that practically all internal diseases have on occasion been attributed to injury; that much plagiarism and uncritical acceptance of authority have occurred; that much flimsy evidence has for years been copied from book to book; and that there is often a hopeless conflict of opinion between pathologists and clinicians.

WALTER H. NADLER, M.D.

Vernetti, L.: Vitamins and the Reticulohistocyte System in the Healing Process of Wounds (Vitamine e sistema reticolo-istiocitario nel processo di guarigione delle ferite). *Arch. ital. di chir.*, 1940, 59: 362.

The results of the investigations of a number of authors show that the vitamins possess to a high degree the capacity of stimulating the repair processes of the tissues and that the reticulohistocyte system assumes great importance in the normal evolution of the repair processes of wounds in any organ or tissue. As recent acquisitions suggest the presence of a functional relationship between vitamins and the reticulohistocyte system, Vernetti has undertaken a series of experiments on rabbits to study the behavior of this system during the healing process of cutaneous wounds subjected to intense treatment with cod-liver-oil ointment. He used 6 pairs of rabbits in which he produced rather large granulating wounds of the back; 1 animal of each pair was dressed with a 50 per cent sterile ointment of cod-liver oil and the other with plain gauze, and the pairs were killed from four to twenty-five days after the intervention. In this series, a 1 per cent trypan-blue solution was used to obtain vital staining of the elements of the reticulohistocyte system, 2 c.cm. per kgm. of weight being injected intravenously on the day of the intervention and then every other day. The vital staining was controlled in another group of rabbits in which 10, 12, or 15 c.cm. of a saturated solution of lithium carmine were injected intravenously on the day before the experiment ended.

The wounds treated with cod-liver oil presented greater activity of the proliferating processes of the cells than those of the controls; this was evidenced macroscopically by the more abundant production of granulating tissue and the earlier tendency of the wound to decrease in size and cover itself with epithelium, and histologically by earlier organization of the newly formed tissue. The reticulohistocyte system, which in the controls showed marked participation in the formation of granulation tissue and later in the formation of the final scar, intervened much more actively in all the various processes of the wounds treated with cod-liver oil. The influence of the vitamin treatment was shown especially by the intense mobilization of the histocyte elements which, charged with a large number of granules, formed the new tissue nearly exclusively and changed rapidly from cells of embryonic type into young fibroblasts, which gradually acquired more adult characteristics, became elongated, and lost a large part of their protoplasm. The observations made in the second group of rabbits corresponded to those of the first group, and both series of experiments confirmed the relationship existing between the reticulohistocyte system and the vitamins.

RICHARD KEMEL, M.D.

Cortese, G.: Clinical and Experimental Contribution to the Study of Bursitis, with Special Attention to the Etiopathogenetic Problem (Contributo clinico e sperimentale allo studio delle borsiti mucose con particolare riguardo al problema etiopatogenetico). *Arch. ital. di chir.*, 1940, 59: 237.

Three principal forms of bursitis are recognized: (1) chronic serous, or hygroma, which is the most frequent, (2) chronic proliferating, and (3) chronic hemorrhagic. Tuberculosis, traumatism, diatheses, disorders of metabolism, and focal infection are the conditions most frequently involved, and among these, tuberculosis and traumatism are the most common.

Cortese describes 8 cases, which he has studied during the past three years, and reports an experiment on rabbits in which he injected blood in the bursa at the back of the tibiotarsal joint to determine the subsequent macroscopic and microscopic changes. The bursæ remained more or less swollen during the observation period of from twenty to forty days. Their internal aspect was whitish and uneven because of small papillary and cord-like elevations. In spite of marked variations in structure, it was easy to distinguish in the wall of the bursæ an external, thick layer of connective tissue with mostly parallel bundles of fibers between which interstitial hemorrhages and numerous newly formed capillary and precapillary vessels could be observed in various parts; small inflammatory foci were frequently found in contact with these vessels, some of which were partially or completely thrombosed. The internal layer consisted of interrupted, flat cells which could not be compared to an endothelial lining and were surrounded by a more or less

abundant zone of intercellular substance, largely homogeneous; in some places, they were pushed toward the cavity by fibrous, rarely fibrovascular, cords which came from the subjacent layer.

The results of his clinical and experimental observations allow Cortese to furnish some data on the etiology, pathogenesis, and significance of chronic bursitis. All his efforts to establish the tuberculous nature of the disorder have failed. In addition, no case of hygroma was discovered among the numerous patients with surgical tuberculosis studied at his clinic, and the 8 reported cases of bursitis healed by first intention although the contents of the bursa in 4 cases were spilled at operation. As there is a tuberculosis of the bursæ, it is necessary to discriminate between non-specific and specific chronic bursitis. In 6 cases, there was a history of a single, direct or indirect, more or less violent traumatism, preceding the appearance of the bursitis by from one to twelve months; a mechanical and chemical irritative action must be attributed to the hemorrhage in these cases, as shown by the results of the previous experiments on rabbits.

The author also investigated the absorption capacity of the bursæ: after partial emptying of the sac, he injected 2 c.cm. of uroselectan B and found that this substance caused no immediate or late signs of irritation; the image of the bursa was well marked for about ten minutes and then began to fade until it disappeared completely in about one hour. This also occurred in joints and demonstrated that synovial linings and mucous membranes have the same structure and function.

The study of pathological and normal bursæ has convinced Cortese that they have no epithelial lining. The principal lesion of bursitis consists of a degeneration of the connective tissue of its wall. This process begins in the fundamental substance, the fibers of which gradually break up and dissolve, and invades the cells secondarily; the dissolved fibers and the liquefaction products of the fundamental substance form the typical contents of the hygroma. The findings suggest mucous degeneration.

RICHARD KEMEL, M.D.

Schaumann, J., and Hallberg, V.: Koch's Bacilli Shown in the Tissue of Lymphogranulomatosis Benigna (Schaumann) by Means of Hallberg's Staining Method. *Acta med. Scand.*, 1941, 107: 499.

The tuberculous nature of lymphogranulomatous benigna is strongly supported by the frequent appearance during its course of a bacillary tuberculosis and especially by the simultaneous disappearance of the lymphogranulomatosis (Schaumann 1922). Lemming made some interesting researches into positive anergy, carried out by means of injecting patients with benign lymphogranulomatosis with BCG vaccine. The absence or the paucity of bacilli in the tissues of this type of patient is, in the authors' opinion, related to the peculiar tuberculin anergy present in these cases, for this anergy indicates immunological resistance to tubercle bacilli which impedes the growth of these bacilli and reduces their vitality or altogether destroys them.

The negative results obtained by inoculating guinea pigs with the gland in a section of which the bacilli were demonstrated, therefore, do not give rise to the assumption that these bacilli are special microorganisms which are very similar to Koch's bacilli. On the contrary, they are in full agreement with the conception that the bacilli discovered are in reality Koch's bacilli, and that lymphogranulomatosis benigna is a tuberculous disease.

SAMUEL H. KLEIN, M.D.

Goodwin, L. G., and Findlay, G. M.: Absorption and Excretion of Sulfonamides Applied Locally; Observations in Rabbits. *Lancet*, 1941, 240: 691.

Sulfanilamide, sulfapyridine and sulfathiazole were applied to uninfected wounds in rabbits, and the rates of absorption and excretion were estimated. A dosage of 0.15 gm. per kgm. of body weight (corresponding to just over 10 gm. for an adult of 70 kgm.) was selected. In most of the experiments a portion of skin about 1 sq. in. in area was removed and the powdered drug spread on the surface of the muscles. In another series, in addition to the skin wound, a portion of the extensor muscle of the thigh, roughly the same size as the skin area, was also removed. With wounds of this size and with the dosage used it was possible to obtain a blood concentration of over 2 mgm. per cent for a short period with sulfanilamide. The other two compounds, however, were not absorbed rapidly enough for this level to be reached. Sulfanilamide was excreted rapidly, sulfathiazole more slowly, and sulfapyridine still more slowly. About 90 per cent of the excreted sulfanilamide was in the conjugated form as compared with 75 per cent of the excreted sulfathiazole or sulfapyridine.

WALTER H. NADLER, M.D.

Jung, W.: The Operative Treatment of Elephantiasis (Die operative Behandlung der Elephantiasis des Beines). *Arch. f. Schiffs-u. Tropen-Hyg.*, 1940, 44: 549.

The author summarizes his experiences of six years in Liberia. After a criticism of the previous classifications, he shows that elephantiasis is to be divided into two forms: (1) the cylindrical (uniform), which may be edematous or acute, and fibrous; and (2) the irregular, which may be fissured, lobular, or bulbous.

In the edematous cylindrical form, pre-operative treatment with baths, massage, bandaging, and elastic stockings is essential, and gives good results. The chief purpose of these measures and of operation is to create new lymphatic channels. In all other cases, especially in the fibrous cylindrical form, it is necessary, in addition, to remove as much as possible of the elephantiac tissue. For typical elephantiasis of the lower leg, the author uses a longitudinal incision that is Y-shaped above and below. He then

dissects out two very large longitudinal masses of elephantiac subcutaneous tissue and leaves one-third of the skin on the back of the calf in contact with the subjacent structures. He removes the tissue down to the deep fascia, and in the fascia cuts a large number (perhaps 25) of windows which are slightly larger than postage-stamps. Through each of these windows, he places a doubled silk suture which he passes deep into the muscle tissue with a needle. The protruding ends of the silk threads are so arranged as to act as wicks and draw lymph from all possible regions of the leg, deep into the muscles. The flaps are narrowed to fit the reduced circumference of the leg, and are closed with drainage. The skin must be smoothly applied over the leg, without tension. This is facilitated by the use of several catgut stitches through the skin and into the muscles.

The irregular forms of elephantiasis require other types of incision, the removal of nodules, and the closure of skin defects with Thiersch grafts. The latter procedure is particularly advisable on the foot, after careful excision of the damaged tissues. In the thigh, the base of the flaps is placed along the saphenous vein, in order to protect the veins and lymphatics. If the entire limb is involved, the leg is operated upon, then the foot and, finally, the thigh.

In 26 cases which the author was able to follow up for most of the time, there were 3 recurrences; in 1 of these the operation had not been worth while. There were about 30 other cases which could not be followed up. Six schematic drawings of the operation accompany the text. Unfortunately, the photographs were confiscated from the author by the British. (GOEBEL). LEO M. ZIMMERMAN, M.D.

Bailey, A. A., and Moersch, F. P.: Phantom Limb. *Canadian M. Ass. J.*, 1941, 45: 37.

"Phantom limb" is a term which is used to designate the sensation of feeling the presence of an extremity following its amputation. Phantom syndromes also may occur following the amputation of a breast or penis, or following the extraction of a tooth. Phantom limb is of more than casual interest, since the associated pain and dysthesia may incapacitate the patient and in some instances lead to drug addiction or suicide.

The authors' paper was based primarily on a clinical study of 55 cases in which the patients registered at the Mayo Clinic for the sole purpose of obtaining relief of this syndrome. To facilitate the analysis of the findings these cases were designated as Group 1. In an effort to obtain additional information regarding the incidence and cause of this syndrome and the severity of the associated dysthesia, the authors made a follow-up study in 50 cases in which patients had undergone amputation of a limb at the clinic. These were designated as Group 2. This follow-up study revealed that this syndrome followed amputation in 43 of the 50 cases.

The cause of phantom limb has received less attention than the treatment. The syndrome has been attributed to many different causes, but this study disclosed certain etiological trends.

The incidence according to sex is not of much significance, as males are more subject to trauma and vascular disease than are females. Other frequent causes of amputation are tumors, infection, and a miscellaneous group of conditions including congenital anomalies. The last named causes affect the two sexes nearly equally.

The incidence of phantom limb according to age is scarcely worthy of comment. As might be expected, most of the patients in each group of cases were between thirty and sixty years of age.

The condition which necessitated the amputation is of some significance. Trauma was the cause in 43 of the 55 cases in Group 1. In the remaining 12 cases in this group the causes of amputation were as follows: infection in 5 cases, tumor in 4, and vascular diseases in 3. In Group 2 the causes of amputation were as follows: vascular disease in 20 cases, trauma in 7, infection in 7, miscellaneous conditions in 6, and tumor in 3. In Group 1, that is, cases in which the patients came to the clinic solely for the relief of pain in the phantom limb, trauma was the cause of the amputation in 43, or 78.1 per cent, and vascular disease was the cause in 3, or 5.4 per cent. In Group 2, that is, cases in which a limb was amputated at the clinic, trauma was the cause of the amputation in 13, or 26 per cent, and vascular disease was the cause in 25, or 50 per cent. The reversal of these two conditions as the predominating cause of amputation in the two groups of cases is not difficult to explain. In most cases in which amputation of a limb is necessary following an accident, the amputation is performed in a hospital near the scene of the accident. On the other hand, a considerable number of patients who have peripheral vascular disease are referred to the clinic for treatment.

The upper extremity was the site of amputation in 36 of the cases in Group 1, and the lower extremity in 19 cases. In Group 2 the upper limb was the site of amputation in 12 cases and the lower limb in 31 cases. The predominance of the lower limb as the site of amputation in the cases in Group 2 was to be expected, as vascular disease was the most common cause of amputation in this group of cases.

A neuroma could be palpated in about 20 per cent of the cases in Group 1. In evaluating the etiological role of neuroma it is interesting to note that in the cases in Group 1 removal of the neuroma was followed by relief of the symptoms in less than half of the cases in which the procedure was employed.

The possibility that the incidence of phantom limb is greater among neurotic persons than it is among normal persons is difficult to evaluate as the symptoms produced by an amputation are likely to bring out neurotic tendencies in a relatively stable individual. Neurotic manifestations were noted in 19 of the 55 cases in Group 1.

A patient suffering from the syndrome known as "phantom limb" usually relates that following the amputation of a limb he becomes conscious of a

sensation of the presence of the lost limb, and that pain in the stump or in the distal portion of the lost limb soon becomes unbearable. In addition to these symptoms the painful stump may be exceedingly hypersensitive, and there may be annoying spasms or jerking of the stump.

In 42 cases in Group 1 the syndrome had been noted immediately after the amputation; in the remaining 13 cases the time that had elapsed between the amputation and the appearance of the syndrome was as follows: less than one month in 5 cases, from one month to one year in 3 cases, and more than a year in 5 cases. In many cases the patients had experienced the sensation of the presence of the lost limb intermittently for several years before the occurrence of distressing symptoms. In 4 cases in Group 1 the sensation of the presence of the lost limb had been experienced intermittently for twelve, twenty-five, twenty-seven and twenty-nine years, respectively, before the patients came to the clinic, but in the majority of cases the average time that had elapsed since the operation was less than five years. This illustrates how rapidly pain becomes a real problem. In 12 cases some symptoms had been present for from five to ten years before the patients came to the clinic. In 4 cases symptoms had been present for from ten to twenty years, and in 6 cases they had been present for more than twenty years.

The pain usually is said to be of a burning, aching, or cramping type. Many patients said that the pain had a crushing, twisting, grinding, tingling, tearing, or drawing quality. Some patients experienced the feeling of the presence of a tight, wire-like band around the phantom limb. Others experienced a prickly sensation as though needles were sticking in the phantom limb. In some cases the phantom limb felt numb. In several cases the patients experienced one of the following sensations: (1) that the fingers on the phantom limb were being twisted out of shape, and (2) that the thumb was being pushed through the palm of the hand. When such sensations were present the patients experienced great difficulty in changing the position of the fingers of the phantom limb. One patient said that this difficulty increased with time. One patient felt as though the nails of the fingers of the phantom limb were being lifted from the nail beds. In 15 cases the pain interfered considerably with sleep.

In far more than half of the cases the patients said that the pain had been present constantly but had varied in intensity.

In 8 of the cases in Group 1 the patients said that the pain was aggravated by changes in the weather. This climatic influence was noted in 21 of the cases in Group 2.

In a few cases the patients said that the pain was worse on days when they were excited or fatigued than it was on days when they were calm and refreshed. Some patients noticed a decrease in severity of the symptoms when they were occupied.

The stump was the site of some distress in most of the cases. About 10 per cent of the patients were bothered by spasm or jerking (so-called choreiform movements) of the stump. In half of the cases the stump was tender or hyperesthetic. In a number of cases, especially in cases in which a neuroma was present in the stump, pressure on the stump produced shooting pain in the phantom limb. The tenderness and hyperesthesia were independent of the presence or absence of a neuroma.

In the cases in Group 1 many of the patients had obtained relief with various types of treatment, but ultimately came to the clinic because of incapacitating symptoms. The authors hastened to add that their results were no better than those obtained before the patients came to the clinic. Fifteen different types of treatment were employed, either at the clinic or before the patients came to the clinic. The patients obtained scarcely more than temporary relief of symptoms. In evaluating the results of the different types of treatment we shall not attempt to distinguish between the treatment used at the clinic and that employed before the patients registered at the clinic.

Injection of alcohol into the nerves and into a neuroma in the stump produced some relief temporarily in 4 cases, but in 5 other cases in which this procedure was employed it did not produce any relief whatever. The results of injection of a solution of procaine hydrochloride into a neuroma and infiltration of the brachial or sacral plexus were no better than the results of the injection of alcohol. In a case in which the syndrome had followed the amputation of a lower extremity the use of spinal anesthesia to produce sensory anesthesia to the level of the nipple did not result in immediate relief.

Some form of plastic operation on the stump was performed in 2 cases. Slight improvement resulted in 1 case, but this was only temporary. In more than half of the cases in which a neuroma was removed the procedure did not relieve the symptoms; in the remaining cases in which the procedure was employed the benefit was only temporary. Removal of a neuroma, injection of alcohol about the nerve endings, and anastomosis of the nerve endings also produced indifferent results. In some cases an exploratory operation was carried out on the brachial plexus and sympathectomy, rhizotomy, or cordotomy was performed, but the patients obtained only temporary relief. In 1 case roentgen therapy was applied to the spinal cord and to the roots of the spinal nerves, but the treatment did not produce any relief.

Application of physiotherapy to the stump relieved the symptoms for a short time in some cases but in others it did not produce any relief. In 1 instance it proved satisfactory when used every three or four months.

The authors mentioned some aspects of the problem of phantom limb which defy explanation on the basis of any single theory. For example, pressure on the stump either in the absence or presence of a palpable neuroma may cause shooting pain in the absent extremity. On the other hand, pressure upon

the sciatic nerve several inches above the stump occasionally stops the pain in the phantom limb and at the same time causes the "sensory ghost" to disappear. It is difficult to understand why slight pressure on the nerve may bring about temporary relief in 1 case but cutting of the sciatic nerve in another case does not result in permanent freedom from the symptoms. This to the authors' minds confounded all explanation of the pain on the basis of peripheral or central excitants.

Enough was said to indicate that treatment must be directed in a strictly psychological manner. It may include the use of some surgical procedure in rare instances. For example, the authors believed that a tender painful neuroma of the stump should be removed.

Dodd, H., Heekes, J. W., and Geiser, H.: Progressive Postoperative Gangrene of the Skin. *Arch. Surg.*, 1941, 42: 988.

Three new cases of progressive postoperative gangrene of the skin are reported. The cases published since 1935 are abstracted and a table of all cases found in the literature is given.

The characteristic features of progressive postoperative gangrene of the skin as described in the literature and observed by the authors are:

1. Steady progressive destruction of the skin and subcutaneous tissue, but not of the muscles, fascia, or deeper structures. It usually begins in the stitch holes and progresses until the entire trunk is denuded of skin unless death or suitable treatment intervenes.

2. Great pain in the gangrenous edges of the wound, with a fair constitutional condition, although there is moderate variable pyrexia.

3. The simultaneous occurrence of streptococcic and staphylococcic infection.

4. The fact that all treatment, including administration of vaccines and serums, with the exception of the cautery, is useless.

Emphasis is laid on the need for early diagnosis.

It is concluded that the best treatment for postoperative gangrene of the skin is prompt excision of the edges of the wound with the cautery. Another successful remedy is the introduction of maggots into the wound, as described by Holman. Skin grafting accelerates healing.

SAMUEL H. KLEIN, M.D.

Basile, A.: Is Surgery Justified in the Treatment of the Thymus for Pseudoparalytic Myasthenia Gravis? Clinical and Experimental Studies (È giustificato il tentativo d'intervenire chirurgicamente sul timo nella myasthenia gravis pseudoparalitica? Studio clinico e ricerche sperimentali). *Arch. ital. di chir.*, 1940, 58: 291.

Surgery offers some therapeutic hopes in the treatment of the complex clinical syndrome of myasthenia gravis pseudoparalytica since Sauerbruch successfully treated a woman suffering from this condition by removing a hyperplastic thymus gland. The thymus theory as to the pathogenesis of this syndrome was first suggested by Laquer and Weigert in 1901 on the basis of personal observation of a tumor of the thymus associated with a severe form of the disease. Lievre reported a series of 68 cases of myasthenia gravis, in 57 of which autopsy showed either neoplasm or hyperplasia.

After a description of the brief and contradictory literature on the experimental pathology of this condition the author proceeds to discuss his own contributions. The purpose of the author's studies was to determine a functional relation between the thymus and the striated musculature, and to see whether it is possible to induce changes in the muscle tissues similar to those found in myasthenia gravis pseudoparalytica.

In one group of experiments the author fed or injected thymus tissues and extracts into dogs; in these dogs the muscle tissues were examined histologically and the phosphorus content of the muscles was noted. In a second series the thymus gland was removed surgically from pigeons and the muscles were then studied microscopically and biochemically for their phosphorus content.

The majority of the animals fed fresh thymus tissue by mouth showed a definite improvement in muscular function; there was an improvement in the general condition and in weight; the animal became more agile and more resistant to fatigue. There was also an increase in the muscle phosphates. Particularly interesting was the increased capacity for phosphorus synthesis. Histological examination of these dogs showed an increase in the perinuclear sarcolemma. Only 1 of these dogs showed an unusual reaction: inco-ordination of movements with final paresis. This animal's capacity for phosphorus synthesis fell from 82 to 33 per cent, and microscopic study showed serious degenerative changes in the muscle tissues.

The pigeons from which the thymus gland had been removed were in a state of torpor and diffuse tremor. They also displayed a disturbance of phosphorus metabolism, especially of phosphorus synthesis.

The author believes that there is undoubtedly a correlation between the thymus gland and striated muscle tissue. Hypothymic function diminishes muscular activity, and hyperthymic function stimulates muscular activity. The author points out that clinical experience also indicates a correlation between the thymus gland and the function of striated muscle. These data justify the surgeon's attempt to treat this condition surgically.

JACOB E. KLEIN, M.D.

Heiman, J.: The Effect of Androgens and Estrogens on Spontaneous Benign Mammary Tumors in the Rat. *Am. J. Cancer*, 1940, 40: 343.

The effect of exogenous hormones on spontaneous benign mammary tumors was studied in a series of 94 female and 3 male rats. The period of observation of the animals extended from one to two years and was continued in all cases until death. The

tumor and host were then given a necropsy examination. It was noted that tumors develop most frequently in breasts rarely suckled by the young, and it is believed that absence of nipple stimulation followed by duct occlusion and hormonal action is a factor in initiating changes leading to neoplastic growth. The morphological tumor types were adenofibroma (70 per cent), adenoma (16 per cent), cystadenoma (6 per cent), and fibroma (8 per cent).

Several series of experiments were done. In the first series the original spontaneous tumors were removed and autotransplants or homotransplants of tumor fragments weighing 0.3 gm. were introduced in both the axillæ and groins of the same animal subcutaneously. From 1 to 4 of these implants grew in all animals after a latent period, the most rapid growth occurring usually at the primary tumor site. When the autotransplants reached a certain size they were removed and small fragments were reimplanted in the same animals. Such serial autotransplants were repeated from two to five times. No pronounced morphological changes were observed in the transplants as compared to the primary tumor. Homotransplants of spontaneous adenofibroma retained the morphological features of the primary tumor only if the recipient had originally had a spontaneous adenofibroma. In the animals originally having fibromas, the same homotransplants lost their glands and were transformed into fibromas resembling the original excised tumor. With certain exceptions the reverse was not true, since fibromas remained fibromas in animals from which spontaneous adenofibromas had been removed.

In a second series of animals bearing spontaneous tumors or with autotransplants or homotransplants estrogen was administered after removal of the original tumors. After such treatment large spontaneous tumors showed no morphological change. The autotransplants and homotransplants, however, grew more rapidly. The latent period was reduced and the morphology changed to that of a soft adenoma, cystadenoma, or papillary cystadenoma. The epithelial components of these tumors showed an increased proliferative capacity and a secretory phase was observed. Autotransplanted fibromas in rats treated with estrogens remained fibromas although these animals showed general effects of the estrogen treatment. Homotransplants of fibromas in treated rats from which spontaneous epithelial tumors had been originally removed showed a moderate growth of ducts and glands. Without injections this did not occur. The possibility of latent epithelial elements in these fibromas must be assumed, but since estrogen treatment alone does not cause this development another growth factor must be present in the host. Homotransplants of epithelial tumors in treated rats from which spontaneous fibromas were originally removed developed into rapidly growing adenofibromas or adenomas. If the dosage of estrogen was small with eventual elimination of treatment the epithelial components gradually disappeared and the tumor became fibromatous.

These hosts lack hormonal or other growth factors for abnormal epithelial proliferation when the exogenous hormone is withdrawn. It appears that growth-stimulating factors necessary for abnormal connective-tissue growth are not identical with those necessary for abnormal epithelial growth. Estrogen evidently does not stimulate growth of mesodermal tissue but is an accelerator of the growth of specific glandular epithelium.

In a third series of experiments the animals were treated with androgens. A large spontaneous tumor showed no histological change. Autotransplants or homotransplants of adenofibroma did not grow in 80 per cent of these rats. In a few animals small hard fibrous tumors grew very slowly after a prolonged latent period. Thus androgens inhibit the epithelial portion of these tumors. When tumor growth was inhibited the ovaries were atrophic and fibrotic.

Both androgen and estrogen together or in sequence were injected in a fourth series of animals. Large spontaneous tumors did not grow. Early, small spontaneous tumors and autotransplants and homotransplants all grew. The ratio of estrogen to androgen was 1:10 and in this ratio it appears that the stimulating effect of estrogen overcomes the inhibiting action of androgen.

The author concludes that estrogens stimulate and androgens inhibit the epithelial components of early spontaneous tumors, and of autotransplanted and homotransplanted adenofibromas. The connective-tissue components of these tumors are not directly affected by estrogens and are inhibited by androgens. The morphological changes occurring are illustrated by photomicrographs. In no instance did a true carcinoma develop.

JOHN L. LINDQUIST, M.D.

Woodhouse, D. L.: The Chemodiagnosis of Malignancy. *Am. J. Cancer*, 1940, 40: 359.

This review comprises (1) a short summary of methods advocated by various workers for the serodiagnosis of malignancy, (2) some general considerations pertinent to the subject of cancer serum tests, and (3) an account of the more recent serodiagnostic studies carried out at the Birmingham Center.

The numerous biochemical reactions proposed by various workers for the diagnosis of cancer may be classified in several groups:

Group I includes tests involving analyses for specific chemical constituents of the blood, such as fibrin, calcium, magnesium, cystine, lipins, and glutathione. Also included in this group are tests involving the precipitation of protein or other components from the blood. The latter tests depend on variations in buffer capacity and the relative amounts of albumin and globulin. A number of Group I tests are named and described.

The Group II biochemical tests are those which employ physicochemical methods to measure surface tension, pH value of the serum, the sedimentation rate, and the electrical resistance of cells.

In Group III(a) are reactions of the antigen-antibody type, and (b) reactions dependent on enzyme changes. The former tests utilize tumor extracts or embryonic tissues and involve the clumping of cells, flocculation, cytolysis, and cutaneous reactions, while the latter are based on lipolysis, proteolysis, and phosphatase estimations.

Group IV tests involve hormone assays, especially of the prolans excreted in certain types of malignancy of the genitalia. These tests are analogous to the biological tests for pregnancy such as the Aschheim-Zondek and Friedman tests. A number of tests falling into each group are named and described.

The general consideration of the problem of cancer serodiagnosis raises the question of whether or not there is a rational basis for such diagnosis. Up to the present time, with one or two special exceptions, it has been impossible chemically to detect a specific substance elaborated by malignant tissue. If such a substance were elaborated the comparatively huge mass of host tissue would make its quantitative detection difficult. The evidence at hand indicates that the difference between the malignant cell and the normal cell is a matter of growth that is not as yet translatable into terms of biochemistry. Unless there is some fundamental difference in their biochemical natures, "one would not expect the host to react against the malignant cell as though it were an alien, by the evocation of antibodies."

Nevertheless certain diagnostic tests are based on the assumption that some form of antibody defense mechanism may be elaborated in cancer. The experimental data supporting the assumption are mostly derived from observations on transplanted tumors, and it would be fallacious to attribute the same reactions to spontaneous cancer. It is known that animals may have a natural resistance or may develop an acquired immunity to certain types of transplanted tumors. The evidence indicates, however, that this immunity is not an anti-tumor immunity but an anti-protein immunity similar to species immunity.

Group I tests attempt to show changes in the constitution of the blood serum in malignancy. Such changes undoubtedly occur but are probably due to secondary effects of the disease such as anemia, toxemia, and the absorption of cell disintegration products. Similar changes are to be expected in non-malignant diseases. The same lack of specificity probably applies to the Group II physicochemical reactions. Group III(a) tests are highly speculative since the evidence for antibody production in spontaneous cancer is open to criticism. The assay of the urine for prolan in chorioepithelioma is an example of a Group IV test which is valuable in the diagnosis of that particular tumor. Other hormone assays, e.g., estrogens, have so far provided little help in this kind of diagnosis.

At the Birmingham Center special investigations were made of two tests which fall into Group III(b), based on enzyme changes. One of them, the Fuchs reaction, has given encouraging results, while the other, based on lipolytic augmentation, has not. Another test investigated was the vanadate reaction. The methods of carrying out these tests and of evaluating their accuracy in diagnosis are described. The correspondence of the results of the tests with the clinical and histological diagnosis is the essential basis of their accuracy.

The lipolysis test, when done by the described technique, failed to show a specific diminished augmentation value for cancer sera. With the vanadate flocculation test the results corresponded with the clinical diagnosis of malignant or non-malignant disease in only 75 per cent of the cases and in the remaining 25 per cent the test gave an incorrect diagnosis.

With the Fuchs proteolytic reaction, the results of the tests were more accurate. This test was applied to the serum of patients with malignant and non-malignant diseases as well as to extracts of malignant and non-malignant tissue. In a series of 303 patients who had had no radiation therapy the correct result was obtained in 81.8 per cent, including malignant and non-malignant cases. Experience has shown that anomalous results are obtained when the test is applied to the serum of patients who have had radiation therapy. When the test was applied to extracts of histologically malignant tissue, 70 per cent of the extracts gave a correct reaction. In the case of non-malignant tissue extracts, 90 per cent of the reactions were correct.

Reviewing the results of the three methods, the author concludes that none of them has the specificity to afford the assistance desired. The fact that a high percentage of non-malignant cases gave false positive reactions is to be regretted. The Fuchs reaction gives the most encouraging results and it appears that the test is not without good foundation.

JOHN L. LINDQUIST, M.D.

Brockbank, E. M.: Mule Spinner's Cancer. *Brit. M. J.*, 1941, 1: 622.

Epithelioma of the skin occurs frequently in cotton mills among spinners, mostly in males over fifty years of age. The left side is involved in 80 per cent of the cases, presumably because of constant friction against the front bar along the machine in bending forward to piece threads. The primary cause is believed to be mineral oil, a known carcinogenic agent, which becomes sprayed on the spinner's clothes while he oils the machine and which he subsequently wipes off on the clothes about the hips to clean the fingers. In the hot workrooms the spinners perspire freely, thus washing off sebaceous gland secretions and allowing the oil to penetrate the skin. This is especially likely to happen in the scrotal area, which is likewise subjected to irritation from friction of the trousers during movements at the machine. Some observers believe that ichthyosis and neglect of soap and water cleanliness are accessory etiological factors. Brockbank believes this disease entirely preventable and offers the following prophylactic measures:

1. Regular periodic examination of the spinners by physicians trained to pick out early signs of epithelioma such as local ichthyotic thickening, papillomas, or warts. 2. Immediate excision of these early lesions followed by roentgen or radium irradiation to prevent hopeless extension by the lymphatics into the groins. 3. Substitution of safer oils or blends for the carcinogenic oils. 4. Protection of the skin by the wearing of additional trousers or shorts. 5. Careful washing, especially of the scrotal region. 6. Protective lanolin-olive-oil ointments for use by men over fifty and those who have a dry skin. 6. Education of the spinners by distribution of pamphlets illustrating the lesions at stages suitable for removal.

EDWIN J. PULASKI, M.D.

Johnson, A. S., and Lombard, H. L.: The Estimation of Operative Risk in Patients with Cancer. *New England J. Med.*, 1941, 224: 759.

The authors studied the operative records of 2,445 cases of major operations at the Massachusetts State Cancer Hospitals at Pondville (1927–1939) and Westfield (1937–1939) for the effect upon operative mortality of such factors as obesity, malnutrition, hypertension, and cardiac history. In the study they used the criteria of Warren to define operative mortality, i.e., patients dying within one month after operation were operative deaths provided the death was not due to the natural course of the condition for which the operation was performed. They also included a few patients surviving the arbitrary period of one month but who pursued a progressively down-hill course. Fifty-five and eight-tenths per cent of the patients were given an autopsy examination. Histories were relied upon for the remainder. The data are presented in a number of tables.

With a statistical approach, the authors concluded that the most important factors influencing the operative mortality were age and the length of the operation. In the total of 386 deaths, the causes of postoperative death, listed in the order of their frequency, were sepsis (40.3 per cent), pneumonia (26.1 per cent), cardiac failure (11.1 per cent), pulmonary embolism (7.5 per cent), hemorrhage (5.7 per cent), renal failure (3.1 per cent), surgical shock (4.9 per cent), and all other causes (1.3 per cent).

MARIAN BARNES, M.D.

Kozdoba, A. Z., and Schwartz, E. Y.: The Results of Surgical and Combined Treatment of Patients with Malignant Tumors. *Vestnik khir.*, 1940, 60: 485.

The authors reviewed 1,837 case histories of patients with malignant neoplasms.

In cancer of the lip the best results were obtained from a radical operation followed by x-ray irradiations. The results of treatment were better in the upper lip than in the lower.

In cancer of the breast the greatest number of three-year and five-year cures were obtained in a group of patients treated by means of radical breast amputation followed by roentgen therapy.

In cancer of the large intestine, x-ray therapy and the formation of an artificial anus seemed to prolong the life of the patient.

The author emphasizes the importance of early diagnosis of malignant tumors.

JOSEPH K. NARAT, M.D.

GENERAL BACTERIAL, PROTOZOAN, AND PARASITIC INFECTIONS

Vaccarezza, R. F., and Gómez, J. B.: Pulmonary Pictures in the Extrathoracic Forms of Tuberculosis (Cuadros pulmonares en las formas extratorácicas de la tuberculosis). *An. de la cátedra de patol. y clin. de la tuberculosis*, 1940, 2: 307.

The clinical and roentgenological study of 420 cases of extrapulmonary tuberculosis in patients of all ages and presenting varying morbid conditions revealed the presence of pulmonary changes in 90.2 per cent of the cases. In 30 per cent, the pulmonary lesions were of the residual type, mostly sequelæ of the primary infection and of hematogenous disseminations; in 54.8 per cent, the pulmonary lesions were active and represented various dominating tuberculous processes, such as an active primary complex, secondary infiltration, acute miliary tuberculosis, slight or chronic hematogenous dissemination, hematogenous dissemination with cavitation, and ulcerofibrous and fibrocaseous tuberculosis; and in the remaining 5.4 per cent the lesions were active involvement of the lymph nodes from the primary pulmonary infection.

The hematogenous pulmonary lesions largely predominate in extrapulmonary tuberculosis: 35.9 per cent of the patients had pulmonary lesions with clinical symptoms of evolutive character in most cases. Isolated extrapulmonary tuberculosis (limited to one organ or to an organic system) was found in only 47.8 per cent of the patients. In most cases, extrapulmonary tuberculosis does not behave like isolated chronic organic tuberculosis: it has a tendency to give rise simultaneously or successively to localizations in other organic systems, including the lungs. There is no antagonism between extrapulmonary tuberculosis and pulmonary lesions, and the one type does not tend to exclude the other. On the contrary, the association of the two localizations in space or in time is frequent. Although the pulmonary lesions are rather of the hematogenous type, the ordinary forms of chronic pulmonary tuberculosis are not at all rare.

More complete knowledge of the hematogenous modalities of pulmonary tuberculosis and better study of the patients, especially the systematic roentgen examination of the lungs in conjunction with the improvements in the roentgen technique, have allowed the recognition of a proportion of combined extrapulmonary and pulmonary tuberculosis, which was unsuspected up until a few years ago, and have thus displaced the concept of isolated chronic disease. The anatomical and evolutive correlation between pulmonary and extrapulmonary foci does

not occur with sufficient frequency to favor its establishment as a law. Roentgen examination of the lung must be systematically performed and repeated in the cases of extrapulmonary tuberculosis: this clinical requirement is absolutely imperative. It is also necessary to make a systematic search for the tubercle bacillus in the sputum or in the gastric contents, even when pulmonary changes are not demonstrated roentgenologically; until this investigation has been made, it is advisable to consider the patient as infectious.

A search for extrapulmonary foci must be conducted systematically in patients having pulmonary tuberculosis, all the more so if the latter is of hematogenous origin. Roentgen examination of the lungs is capable of furnishing valuable data to support the tuberculous nature of an organic disorder of obscure or doubtful etiology in a given case: a negative result constitutes no proof against tuberculosis. In disorders in which the etiology is not sufficiently established, the frequent presence of hematogenous pulmonary lesions would seem to favor a tuberculous origin.

In all cases of extrapulmonary tuberculosis, it is necessary to determine and treat the original focus and the pulmonary and extrapulmonary metastases found. Extrapulmonary tuberculosis should not be treated without the intervention of the phthisiologist; in fact, the treatment should be conducted under the strict collaboration of the phthisiologist, surgeon, orthopedist, and specialist of the involved organ or system. For individual and collective reasons, patients with extrapulmonary tuberculosis should not be hospitalized in a general service, but should be placed in a specialized section. The so-called isolated chronic organic tuberculosis should be considered not as a local disease, but as a general disease capable of involving various organs.

RICHARD KEMEL, M.D.

EXPERIMENTAL SURGERY

Cramer, C. D.: Experimental Thrombosis (Experimentelle Thrombose). *Nederl. Tijdschr. v. Verlosk.*, 1940, 43: 160.

According to many authors, anaphylactic shock, an allergic reaction, is ameliorated by high doses of Vitamin C. For this reason the authors undertook to determine the significance of Vitamin C in the production of thrombi in anemic rabbits, which animals are known to acquire thrombosis after injury to the wall of the vena cava. The animals were made anemic, laparotomized, and the wall of the vena cava was cauterized. On these spots an intraluminal thrombus was formed which more or less closely resembled an unattached central thrombus. One series of animals received daily injections of redoxon (Vitamin C) from the first day of bleeding to the fifth day following the operation; a second series which received no Vitamin C was used for control.

It was noted that there was a definite reduction in the spread of thrombi in the group receiving Vitamin C. The author concluded, therefore, that a systematic investigation of the Vitamin C content of the blood of patients who are in danger of thrombosis is necessary before these results may be practically applied to human patients.

(DE SNOO). STANLEY ROBBINS, M.D.

HOSPITALS; MEDICAL EDUCATION AND HISTORY

Davis, J. S.: The Story of Plastic Surgery. *Ann. Surg.*, 1941, 113: 641.

This paper is the author's Presidential Address before the Southern Surgical Association summarizing the evolution of the basic principles on which modern plastic surgery is built.

Plastic surgery is one of the oldest of the medical specialties. It is primarily that branch of general surgery which is formative and constructive. Proficiency in plastic surgery demands the same familiarity with the fundamental medical sciences and the same application of surgical principles as is essential in any type of surgery, with, in addition, a refinement of technique, a sense of geometric proportions, and an artistry not commonly called for in the execution of most surgical therapeutic procedures. It deals with the repair of defects and malformations, either congenital or acquired; with the restoration of function and comfort; and with improvement in appearance and consequent relief of consciousness of deformity. The field is not limited to the face alone but extends from the top of the head to the soles of the feet.

Much of the history of plastic surgery is associated with operations for nasal reconstruction. Such reconstructions are reported in the Edwin Smith Papyrus (1600 B.C.), but probably the earliest true plastic surgery was done by the Hindus and was carried by students and itinerant surgeons to Arabia and the Mediterranean countries. The Hindu surgeons were trained in anatomy and became very dextrous in operative surgery. Sushruta (800–750 B.C.), the father of Hindu surgery, described methods of advancing cheek flaps for reconstructing the nose, as well as methods for repairing mutilated lips and ears.

Hippocrates (460–370 B.C.) and Aristotle (384–322 B.C.) make no mention of skin shifting but described in De Re Medica (A.D. 30) the operative treatment of deformities of the eyelids, the use of flaps for mutilated ears, noses, and lips, the separation of fingers in syndactylism, and a plastic operation on the penis. No mention is made of congenital clefts of the lip. Many of the procedures were probably derived from Hindu sources but no references are made to them. Galen (A.D. 131–201) described various procedures similar to those of Celsus, but Celsus was given no credit for his contributions.

The use of an arm-flap to reconstruct the nose was first accomplished by an obscure Sicilian family named Branca and first recorded by the Bishop of Lucerne in 1442. It later became known as the

Tagliacotian or Italian method because Tagliacozzi (1549–1599), who wrote the first systematic treatise on plastic surgery, brought it to public attention and popularized it. Tagliacozzi incurred the antagonism of the church and after his death this method became a legend and was considered impossible. Fortunately some of his books were saved from destruction by the church and later editions published.

The Indian method of rhinoplasty by means of a forehead flap was described to European surgeons in 1794 by two medical men of Bombay who had observed it practiced by the Tilemaker caste in India. It was introduced in London by Carpue, in 1814; into Germany by von Graefe, in 1916; into France by Lisfranc, in 1826; and into the United States by Warren in 1834.

The name of Dieffenbach (1792–1847), of Koenigsberg, will long be remembered. He was a genius in plastic surgery and his methods are in use unchanged today. His writings gave a great stimulus to the subject. In the United States at this same time, four surgeons, who did pioneer work and had important influence on plastic surgery in this country, deserve mention: Mettauer (1787–1875), Pancoast (1805–1882), Warren (1811–1867), and Mutter (1811–1859). It is due to these men that the use of pedicled flaps became more common and modifications such as the "island flap" (Gersuny, 1887) were introduced. To Gillis of London belongs the credit for showing the tubed flap and popularizing its use.

There seems to be some doubt whether the ancients actually succeeded in the free transplantation of skin. Successful full-thickness grafts were reported experimentally in 1804, but it wasn't until Reverdin reported his "epidermic grafts" in 1869 that interest became aroused. Ollier in 1872 and Thiersch in 1886 successfully transplanted large films of skin using the epidermis and part of the dermis. Modern surgeons have modified and perfected methods of utilizing these grafts. The successful use of free full thickness grafts was first reported by Wolfe in 1875.

Methods of transplantation of tissues other than skin have been developed within the last fifty or sixty years. These tissues include bone, fascia, cartilage, tendon, cornea, nerve, and even digits. Likewise, there have been improvements in methods of treating clefts of the lip and palate, hypospadias, scar contracture, hemangiomas, syndactylism, and other deformities interesting to the plastic surgeon.

In the present emergency it seems wise to emphasize the importance in the program of Medical Preparedness of combining the Faciomaxillary Division into a Plastic and Faciomaxillary Division. Should this be done and the division be properly developed and manned, it will add enormously to the efficiency of the care of the patients with lesions requiring plastic surgery of the neck, trunk, and extremities, as well as of the face and jaws. This is essentially the type of organization that was developed in England as early as August, 1940.

In the light of the role played by plastic surgery in the mutilating wounds in war and the accidents of civil life, it seems evident that there should be close co-operation between the trained plastic surgeons in the Accident Department and the Surgical Service of every great hospital. BRADFORD CANNON, M.D.